Appropriate Use of Cesarean Section

Recommendations for a quality assurance program

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Dear Ms. Lindberg:

The Cesarean Birth Planning Committee was assembled at the request of the Ministry of Health to review cesarean births in the province. Our multidisciplinary planning group has now concluded its deliberations and hereby respectfully submits its findings and recommendations.

Yours very truly,

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Executive Summary

Summary

Introduction and Work of the Committee (Chapters 1 & 2)

In November 1989, the development of a cesarean birth quality assurance committee was announced at an international conference on quality assurance held in Toronto. The committee was asked to devise the structure and operation of a collaborative, ongoing quality assurance program that would promote optimal outcomes for mothers and newborn infants.

The frequency of cesarean birth in Ontario is among the highest in the world. International comparisons show considerable variation in rates. High rates are not necessarily associated with improved health for mothers or newborns. Low levels of perinatal mortality are achieved in some countries that also have low cesarean rates.

The Canadian Consensus Conference on Aspects of Cesarean Birth was held in 1985 to focus national attention on the appropriate use of cesarean section for women with various obstetrical conditions. The Consensus Panel issued practice guidelines that were published in the *Canadian Medical Association Journal* in 1986 and distributed to physicians, but the guidelines appear to have had little impact on actual practice.

The multi-disciplinary Cesarean Birth Quality Assurance Committee met over a 12-month period to study this problem further and formulate recommendations. Committee members represented hospital, medical and nursing associations, consumer groups and the Ministry of Health.

The following belief statements guided the development of recommendations:

- That a continued and lasting reduction in cesarean birth rates is more important than a specific numerical target since there is no clear evidence about an ideal rate.
- That current valid information about aspects of cesarean birth is the most appropriate basis for practice guidelines and recommendations.
- That the public and health professionals share the responsibility for changing the current approach to cesarean birth.
- That labour and birth are normal processes in women's lives and the benefits of non-intervention in this normal process are well documented.

The Committee identified two major objectives for a quality assurance program.

1 Reduce the frequency of cesarean births in Ontario, especially those where the major indication is:

a) previous cesarean section; or
b) labour dystocia, particularly when diagnosed in latent or early active labour.

2 Increase the frequency of normal spontaneous births.

Experts describe quality assurance as an ongoing, continuous process wherein activities carried out in providing health care are measured, are compared to objectives, and corrected to improve the health of affected groups.

The Committee's work reflected this approach to quality assurance: current activities and practice guidelines were reviewed, as well as influences on practice that could pose barriers to adopting guidelines and achieving objectives; strategies for bringing about change were examined and new activities were recommended to bring practice closer to guidelines.

Cesarean Birth in Ontario (Chapter 3)

The rate of cesarean birth in Canada is 18.7 per 100 births (1986/87). International data show that only the United States and Brazil have higher rates. Ontario rates stayed slightly above Canada's average for several years. The most recent Ontario rate (1988/89) is 20.03 per 100 births; this rate has varied little since 1984/85.

The overall rate of cesarean birth is lowest in the southwest region (17.8%) and highest in the northeast (22.1%), but within each region there is considerable variation among hospitals. High and low rates are found in small hospitals and in large ones. The variation is not easily explained by any single factor, such as the presence of high-risk women, the availability of specialist physicians, or specific labour care practices. This suggests that multiple factors in a region/hospital contribute to cesarean rates and that programs of change must address these multiple factors.

Leading Indications for Cesareans (Chapter 4)

Repeat cesarean section is the most frequent indication for cesarean in Ontario and accounts for 40% of all cesareans. Of women with a previous cesarean and subsequent pregnancy, 88% have a repeat cesarean (1988/89). Since 1984/85, this proportion

has declined from 95.4%. In the southwest region 86% of women with a previous cesarean had a repeat section, whereas in the northeast region the rate was 95%. The medical literature contains many reports of vaginal birth after cesarean (VBAC). The Committee's review of studies included over 17,000 such labours and showed an average vaginal birth rate of 77% with good outcomes for mothers and infants. No maternal death as a result of a ruptured uterus during labour in a woman with a previous lower segment incision has been reported for decades in industrialized countries.

Maternal morbidity is higher with repeat cesarean, due to anaesthesia, operative injury, febrile illness and psychological responses. The risk of uterine rupture and dehiscence averages 0.2% and 0.4% respectively in reported series, and does not appear higher in women who labour than in those who have elective repeat cesareans. Perinatal morbidity and mortality show equivalent outcomes for VBAC compared with elective repeat cesarean.

Dystocia accounts for 19% of all cesareans and is the second most common reason for cesarean in Ontario. This diagnosis is more frequent in first labours and is the leading cause of primary cesarean section. Scientific evidence about the *best* diagnostic criteria for dystocia is lacking; working guidelines were offered by the consensus panel in the 1986 statement. Evidence from one Ontario survey shows that dystocia is frequently diagnosed and treated with cesarean in latent labour, which does not conform to the published guidelines. Experts recommend the use of labour partograms to more consistently diagnose dystocia. Further research is needed to understand the relationship between dystocia and such aspects of labour care as amniotomy, oxytocin use, labour support and epidural use. Reducing dystocia, and cesarean as its treatment, is important to the overall lowering of the cesarean rates because fewer women are then exposed to the possibility of repeat cesarean.

Review of Practice Guidelines (Chapter 5)

The practice guidelines contained in the Consensus Conference Report (1986) on indications for cesarean section were reviewed carefully to determine whether changes were needed because of new information. Eight areas were identified for potential revision. Information was sought from health professional, hospital and consumer organizations about their perceptions of the need to update existing practice guidelines. The Committee reviewed information about the following:

- **Designation of appropriate hospital facilities**
  Based on evidence about the occurrence of emergency situations, the committee concluded the guidelines should be revised to state that any hospital obstetric service with emergency cesarean section capacity can, without additional resources, safely care for women in labour after a previous cesarean.
- **Labour after more than one previous cesarean**
  The literature review shows a growing, but still relatively small, experience with labour after more than one previous cesarean. The VBAC rate (70%) and estimated complication rates appear equivalent to outcomes in women with one previous cesarean. In view of the accumulation of experience, the Committee agreed that the decision about method of birth should be made by a woman and her physician.
- **Use of oxytocin in labour after a previous cesarean**
  The reports of oxytocin use are increasing, and judicious use of oxytocin appears to be safe. More research is needed as well as clearer distinctions in published reports between oxytocin use for augmentation and induction of labour.
- **Labour with a multiple gestation or breech after a previous cesarean**
  The literature reports show good outcomes, but the experience remains quite small. The Committee concluded that women and their physicians must make individual decisions.
- **Requirement for an antenatal and intrapartum notification/consultation with an obstetrician/surgeon**
  The Committee concluded that for women with a documented previous lower segment uterine incision, the primary care provider is not required to obtain an antenatal consultation from an obstetrician. Resources for intrapartum care are to be available as for any woman in labour.
- **Criteria for diagnosis of dystocia**
  The recommended criteria in the Consensus Conference Report for diagnosing dystocia were supported, as well as the use of a standardized partogram in labour.
- **Efficacy of external cephalic version**
  The evidence accumulated since 1985/86 shows this procedure to be effective when used at term to reduce breech presentations and subsequent cesarean sections.

Influence of Non-Medical Factors (Chapter 6)

Non-medical and social factors help to explain why guidelines may not have an impact on clinical practice. These factors include fear of litigation, individual practice styles, practice settings, convenience, financial incentives, resources and women's preferences.

Recent surveys show that obstetricians have increased their use of certain practices in the last three years, including practices that do not have established effectiveness; e.g., routine ultrasound, biochemical tests of fetal well-being, electronic fetal monitoring and cesarean section for

suspected fetal distress. Litigation fears strongly influenced the use of these technologies. More liberal use of cesarean section is often viewed as a means of decreasing the threat of litigation.

Recommendations recently published in *Liability and Compensation in Health Care* by J. R. Prichard include increasing quality of care and developing a no-fault compensation plan for persons suffering avoidable injury. Practice guidelines and peer review are methods for increasing the quality of care. A new compensation plan could help decrease practitioners' fears of litigation.

The Canadian Medical Protective Association is a prime source of information for physicians about liability issues. Its statement about cesarean section does not reflect the demonstrated safety of VBAC.

Changes in the number of physicians who provide obstetrical care are raising concerns that several communities soon may be without obstetric services. Specialists and family physicians cite lifestyle and liability exposure as reasons for leaving obstetric practice.

Investigations have studied the relationships between financial compensation and cesarean rates. Financial incentives for VBACs have been suggested as a means of increasing their frequency. At the least, fees should not reward elective repeat cesareans.

Women's views about the safety and desirability of a cesarean section or labour and vaginal birth need to be better understood. The limited studies of women's preferences show that one-half to two-thirds of women choose VBAC. However, the reasons for preferences and the accuracy of information used by women to make a decision are even less well studied. The amount of interaction between a woman and her caregiver has been shown to be important in acquiring information about method of delivery.

Individual practice styles also have an influence on cesarean rates, but the basis of the clinical decision appears to be complex and affected by many of the non-medical as well as medical factors.

Strategies to Change Cesarean Rates (Chapter 7)

Several reports focus on changing medical practice because the obstetrician/surgeon performs the surgery. Studies have evaluated provision of information, peer review and feedback, administrative changes, participation in change, and rewards/penalties as methods to improve physicians' practice.

Information alone has not been very successful in effecting change unless other factors in the environment make it very easy to make the change and the person believes there is a need for change.

Feedback from a respected leader that includes comparisons to peers has been a successful strategy. Administrative rules and penalties have variable success and can bring about resistance; e.g., imposing a second opinion requirement for an elective cesarean.

Studies of labour care practices show that nursing care practices can reduce interventions during labour and birth. Continuous supportive care from nurses may be one factor that helps reduce cesarean sections. Nurses in obstetric units have limited opportunities for postgraduate specialty education and are in need of increased opportunities to obtain current information.

Increasing the public's knowledge about aspects of labour and birth, especially cesarean section, is important. Women who are informed about available options can discuss them with caregivers. Childbirth education groups and boards of health are important information sources. Widespread dissemination to a broader population of clear information about childbirth care could foster changes in the public's views about maternity services.

Hospital-specific programs to reduce cesarean births have been developed in several North American locations. Typically these involve teaching sessions, some amount of peer review/feedback, and the use of specific guidelines for practice. Second opinions, the use of experts, peer influentials and public information sessions, are part of some programs. Most programs are in large teaching hospitals, but community hospitals also have been able to implement change successfully.

Recommendations (Chapter 8)

The Committee's recommendations are directed to the broad range of factors that influence cesarean rates. Recommendations are addressed to the group(s) or organization(s) best able to implement specific actions.

Broad areas of recommendations include:

- Updating the Consensus Conference Report's practice guidelines to:
  - be more supportive of vaginal birth after more than one previous cesarean;
  - support hospitals with emergency cesarean capability as suitable for women desiring VBAC;
  - omit a required specialist consultation during the antenatal period when there is documentation of a previous lower segment uterine incision;
  - encourage use of external cephalic version at term for breech presentations.
- Making vaginal birth after a previous cesarean the standard of care by:
  - removing previous lower segment cesarean section from a Grade B risk category;
  - developing and distributing a model protocol for care of women in labour after previous cesarean;
  - modifying the terms used to describe aspects of labour after previous cesarean to be less judgmental.
- Reducing the number of cesareans for labour dystocia by

adopting policies that enhance normal labour and birth:

- making judicious use of oxytocin in defined circumstances;
- adopting a standardized intrapartum partogram to aid detection and uniform diagnosis of non-progressive labour.

- Modifying non-medical influences to assist the public and practitioners to change their expectations and behaviour about cesarean birth. Specific recommended changes include:
  - revision of the Canadian Medical Protective Association Statement to reflect the new approaches to VBAC;
  - improving human resource capabilities to make obstetric services available and supportive;
  - altering fee schedules to support VBAC;
  - providing increased education for women and their families about childbirth and cesarean section;
  - increasing opportunities for specialty education of relevant health professionals.
- Developing a system of audit and feedback within each hospital that includes reporting mechanisms.
- Sponsoring a conference about successful strategies so that hospitals and consumers can combine audit and feedback with other strategies as appropriate to their situations.

Acknowledgements

Acknowledgements

The convening of the Cesarean Birth Quality Assurance Committee presented an opportunity for health professionals and consumers to come together to discuss common concerns about an aspect of maternity care that deserves our continuing attention. Cesarean birth is part of everyday obstetric practice in Ontario, and is one of the most important and valuable procedures in situations that gravely threaten a mother or fetus during labour. However, much of our review has highlighted instances where alternatives to cesarean birth may be practised without compromise to mother, fetus and newborn. The judicious use of cesarean section has been our focus over the 10 months the Committee worked together.

I hope this report will be a valuable guide to changing aspects of current practice and a resource for physicians, nurses, midwives, childbirth educators, and women and their families, all of whom confront many questions about the appropriate use of cesarean section.

I would like to thank several individuals for their contribution to this report: Suzanne Bone, graduate student, University of Toronto, for the first draft of many chapters; Karen Webster, perinatal database co-ordinator at St. Joseph's Health Centre, London, Ontario, for assistance with the hospital audit system; Karen Campbell of the Lawson Research Institute for data analysis and interpretation and for being a special consultant to the committee; Louise Hanvey and Monica Prince for assistance with data from the survey of Ontario hospitals; Geoffrey Anderson for analysis of the HMRI data; and special thanks to Denise Eckert for patiently typing, correcting, revising, cutting and pasting and producing the final manuscript.

I also wish to personally thank the Committee members for their commitment to this project and their willingness to listen and learn from each other. On behalf of the Committee, I hope our recommendations will contribute to the ongoing efforts in this province to provide the best possible maternity care to women and their infants.

J. Kenneth Milne, MD, FRCS(C)
London, Ontario
March 1991

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Introduction

Chapter 1

Mandate of the Committee

In November 1989, the development of a cesarean birth quality assurance committee was announced at an international conference on quality assurance held in Toronto. The mandate of the committee was to devise the structure and operation of a collaborative, ongoing quality assurance program for cesarean births in Ontario that would promote optimal outcomes for mothers and newborns. Through collaboration and consultation with professionals and consumers, the Committee was charged to make recommendations to the Ministry of Health for a quality assurance program.

Background

Cesarean section was known in biblical times but few mothers or infants survived. By the 1950s the safety of cesarean section was well established because of modern surgical and anaesthetic techniques. Gradually, it became an everyday event and one of the most common surgical procedures in Ontario. Today 20% of women giving birth experience a surgical birth and their care accounts for 30% of all hospital days for childbirth care.

Questions have been raised about the appropriateness of the current use of cesarean section, especially because rates in Ontario are relatively high compared with other areas of Canada and with other countries. (See Chapter 3 for detailed discussion.) Reported rates from around the world vary from below 10% to over 30% of total births[124] Comparisons of geographic areas, hospitals and individual physicians show considerable variation in the frequency of cesarean section.

The diagnostic indications that lead to cesarean birth also vary among countries, hospitals and physician practices. For example, nearly 90% of women with a previous cesarean section and subsequent delivery have a repeat cesarean in Ontario, compared with 45% in The Netherlands and 53% in Norway[124] Of greater concern is the fact that the variation in rates has not been shown to be associated with improved health status for mothers or newborns. International comparisons show that low levels of perinatal mortality are achieved in some populations that also have low rates of cesarean delivery.

In response to continuing increases in cesarean rates across Canada and the known variation among countries, a national Consensus Conference on Aspects of Cesarean Birth was held in 1985, with participation from medical specialty groups, academics, health professionals and consumers. The Conference resulted in a Canadian Consensus Statement on Cesarean Birth, with guidelines for the appropriate use of cesarean section for women with various obstetrical indications. The statement was nationally endorsed by the Society of Obstetricians and Gynaecologists and professors of obstetrics and gynaecology. It was widely distributed to obstetricians, hospitals and childbirth consumer groups. In addition, it was published in the *Canadian Medical Association Journal*, in June 1986 (See Appendix I). Despite the wide circulation, current research indicates that these guidelines may have had little impact on actual practice[106]

Formation of Committee

The announcement of further study of cesarean birth occurred in November 1989 at an international conference on quality assurance held in Toronto[115] The then Minister of Health, the Honourable Elinor Caplan, stated that she would establish a multi-

disciplinary group to develop a quality assurance program on cesarean births. The Minister's ultimate goal was to improve the health of mothers and newborns by reducing the use of inappropriate cesarean sections. She suggested a 15% cesarean rate as a target goal to be achieved within two years.

Following the announcement, a multidisciplinary committee was formed, with representation from several groups directly concerned with the issue of cesarean birth. The Committee met 11 times between February 1990 and March 1991, and was chaired by Dr. Kenneth Milne, Professor of Obstetrics and Gynaecology, University of Western Ontario and then Chairman of the Ontario Section of the Society of Obstetricians and Gynaecologists of Canada. The 12-member Committee consisted of members from the Ontario Medical Association, the Ontario Section of the Society of Obstetricians and Gynaecologists of Canada, the Ontario Chapter of the Canadian College of Family Practice, the Ontario College of Physicians and Surgeons, the Ontario Nurses' Association, the Ontario Hospital Association, two childbirth consumer groups, Childbirth Concerns, Sudbury, and VBAC/AVAC Canada, and the Ministry of Health (Appendix II). There was representation from community and teaching hospitals and the various geographic areas of the province.

The following sections of this Chapter summarize the discussions of the Committee about relevant philosophic beliefs, objectives for a quality assurance program and the specific terms of reference to guide the Committee's work.

Philosophic Beliefs

The Committee considered the following belief statements to be important guides to its deliberations and formulation of recommendations:

- That a continued and lasting reduction in cesarean birth rates is more important than a specific numerical target since there is no clear evidence about an ideal rate;
- That current valid information about aspects of cesarean birth is the most appropriate basis for practice guidelines and recommendations;
- That the public and health professionals share the responsibility for changing the current approach to cesarean birth;
- That labour and birth are normal processes in women's lives and the benefits of non-intervention in these normal processes are well documented.

Goals and Objectives

The Committee considered the overall goal of a quality assurance program to be improved health of mothers and newborns in Ontario.

Two major objectives were identified that will contribute to achieving this goal:

1 Reduce the frequency of cesarean births in Ontario, especially those where the major indication is:

a) previous cesarean section; or
b) labour dystocia, particularly when diagnosed in latent or early active labour.

2 Increase the frequency of normal spontaneous births.

Terms of Reference

The following terms of reference guided the Committee's work in devising a quality assurance program consistent with its philosophy and capable of meeting the goal and objectives.

1 To assemble and review data on the current status of cesarean section rates and trends in Ontario;

2 To review the 1985 Consensus Statement on indications for cesarean section developed by the National Consensus Conference on Aspects of Cesarean Birth with a view to accepting, refining or rejecting the guidelines;

3 To address the relationship between the use of cesarean sections and physicians' quality of life and stress levels in light of consumer expectations and litigation pressures;

4 To examine current literature, understanding and practice concerning indications for cesarean birth with a view to changing attitudes and practice behaviour;

5 To determine the current situation with respect to education about cesarean births (for physicians, nurses, other health professionals and consumers) and make recommendations to the Ministry regarding the development of effective education programs on cesarean section;

6 To review the strategies used to implement the Consensus Statement on cesarean births and make recommendations on how to effectively implement practice guidelines;

7 To identify and address resources within the health care system that are required to implement and support a quality assurance program.

The Committee approached its work by consulting with experts on medico-legal issues, education strategies, medical indications for cesarean birth, consumer concerns and quality assurance programs used in other jurisdictions. (See Appendix III for the complete list of consultations.) The Committee also requested written submissions from professional organizations (see Chapter 5), completed a comprehensive literature review, and analyzed current data pertaining to cesarean section in Ontario.

All the available information was considered in the formulation of recommendations. However, the views expressed are based on Committee consensus. While they may coincide with views expressed by some groups or individual experts, no attempt is made to represent all the ideas that came from the various consultations.

An Overview of Quality Assurance

Chapter 2

An overview of quality assurance is necessary background for the Committee's work and recommendations. The following is a brief description of an emerging specialty area that is developing and changing very rapidly.

Components of quality assurance programs

Quality assurance is a set of activities designed to improve overall health care. The goal of quality assurance, as described by one of its foremost proponents [11] is in fact *continuous* improvement, not finding fault and not just detecting "bad apples" or outliers.

A program of quality assurance, then, is more than carrying out chart reviews, for example. Rather it is a broadly based program that reflects a comprehensive view of performance improvement. Three components of quality assurance programs have been identified[105]:

1. Measurement of activity; e.g., what is happening? To whom? By whom? For what reasons?
2. Comparison of activity to objectives; e.g., are the activities consistent with goals? Are the desired outcomes being achieved? Is the system doing what it was designed to do?

   This component is called the quality assessment part of quality assurance.
3. Undertaking prompt actions to correct activities that are not contributing to improvement.

In the health care system at present, there is considerable experience and understanding of how to measure activity (the first component). It is relatively easy to obtain measures of the frequency of events, their location, who carried them out, etc.

Comparing activities with objectives (the second component) is more difficult because the objectives of care are usually less visible and less well articulated than are activities. Objectives also exist on two levels, which further contributes to the problem of defining clear end points. First level or primary objectives are those that express "real" outcomes, that are evidence of improvement in the health of target group(s) affected by the treatment/actions. Such outcomes for cesarean birth include, for example, maternal and perinatal morbidity.

Secondary objectives are the so-called process measures. They express intermediate outcomes and reflect the more technical aspects of care. Was the care provided in a competent manner? Was the facility adequate and were appropriate materials available? Was the staff well-trained? Did the patient like the care?

Secondary objectives are easier to assess and quality of care information has often focused on these process measures. This information is useful but limited. Ultimately whether well-qualified persons carry out technically competent procedures in well-equipped facilities matters little if the health and well-being of the recipients are neither maintained nor improved.

To improve care in ways that really matter, the focus is shifting

from secondary to primary objectives. Practice standards and guidelines that are based on a systematic accumulation of evidence about effective care, i.e., care that does more good than harm, become the embodiment of objectives. Standards and guidelines need to be clear and explicit so that actual performance can be compared to them. The medical literature already contains a large amount of information about cesarean birth, and practice guidelines exist that are based on a careful evaluation of literature. These are helpful to the task of developing a quality assurance program for cesarean birth.

Finally, the health care system must have the means and capacity to respond when new actions are required for improvement. The circular process of quality assurance then calls for the new activities to be compared with objectives, reinforcing the notion that continuous change and improvement are desired rather than a prescribed end point.

Organization of Report to Reflect Quality Assurance Components

This description of quality assurance provides a framework for the remainder of the report:

Chapters 3 and 4 are an extensive review of information about activities related to cesarean birth in Ontario, and incorporate the first Term of Reference.

Chapter 5 reflects the second Term of Reference. It considers the existing practice guidelines for cesarean birth and suggests areas for update in view of current information about effective care for mothers and newborns.

Chapter 6 incorporates the third Term of Reference and examines influences on practice that may pose barriers to the adoption of guidelines and achievement of objectives.

Chapter 7 incorporates the fourth, fifth and sixth Terms of Reference and examines the information about the effectiveness of strategies to bring about change in providers and consumers.

Chapter 8 presents recommendations for new activities to bring the practice situation closer to objectives and guidelines.

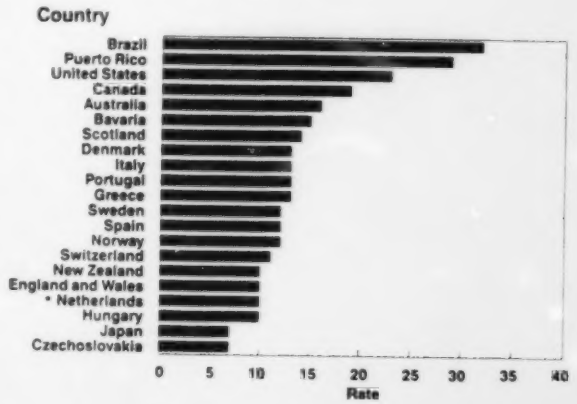
Cesarean Birth in Ontario

Chapter 3

The Committee reviewed the published rates of cesarean birth in several countries. Figure 3.1 shows international comparisons from 1986 or earlier that were published in the *Journal of the American Medical Association* in June 1990[124].

International comparisons

Figure 3.1



Cesarean section rates per 100 hospital deliveries in selected countries for 1985 or most recent year for which data were available (1981 through 1986 for Brazil, 1984 and 1985 for Puerto Rico and Canada, 1982 for Italy, 1987 for Portugal, 1983 for Greece, 1983 through 1986 for Switzerland and 1986 for Czechoslovakia). There was incomplete coverage of cesarean section rates for Australia, Bavaria, Portugal, Spain and Switzerland. *Cesarean rate for all births (including home births) was 6.0/100 births

Rates from 1986/87 were available for selected countries and are shown in Table 3.1.

These comparisons show that Canada has one of the higher rates of cesarean birth. The most striking finding is the magnitude of difference between the highest and lowest rates in both Figure 3.1 and Table 3.1.

Table 3.1
International Cesarean Section Rates per 100 Deliveries

Country	1986	1987
Canada	18.9	18.7
Australia	16.6	16.6
Denmark	13.5	12.1
Hungary	10.1	10.2
Israel	10.1	10.2
Scotland	13.3	13.7
Yugoslavia	6.7	7.4
United States	n/a	24.4

Notzon[124] published comparative rates of perinatal mortality, which are reproduced in Table 3.2 He observed only "a weak and nonsignificant association" (correlation coefficient, 0.33; P = 0.15) between perinatal mortality and cesarean birth rates. The data demonstrate that some countries have both low cesarean and low perinatal mortality rates. Lomas and Enkin[107] comment that the lack of relationship between crude

perinatal mortality and operative delivery rates is not surprising because the main determinants of perinatal death (like prematurity) are not likely to be influenced by method of delivery.

International comparisons of morbidity measures related to cesarean section would be very useful to an overall assessment of the effect of differing cesarean section rates. However, because of the lack of uniformity in the definition and reporting of perinatal conditions, these measures are not available.

Comparative Trends Across Canada

The international comparisons of recent years do not show the changes that have taken place throughout Canada over the past 20 years. The increase in cesarean birth in that interval can be seen in Table 3.3. In 1969 a woman had a 1 in 20 chance of having a cesarean; by 1985 this was nearly 1 in 5.

The changes in Ontario rates have followed the national average very closely. Differences between provinces are much less pronounced than the international differences. Still, in 1986/87, there was a 50% differential from Manitoba (13.7%) to Newfoundland (21%).

Trends in Ontario

Table 3.4 shows information about obstetrical and perinatal events in Ontario for the years 1984-1989. (Information in the lower part is for periods April 1 – March 31 of reported years.) The relative proportions of cesarean, instrumental and spontaneous births are displayed. The Committee noted not only the apparent stabilization in the cesarean rate but a slight increase in spontaneous births over the five-year interval.

Table 3.4 includes the number of vaginal births after cesarean section (VBAC) calculated from Hospital Medical Records Institute (HMRI) information. These numbers should be interpreted

Table 3.2

Perinatal Mortality Ratios* in Selected Countries

Country/Region	1985	Country/Region	1985
Australia	11.1	Netherlands	9.9
Brazil	n/a	New Zealand	8.9
Canada	8.8**	Norway	9.4
Czechoslovakia	12.4	Portugal	16.9****
Denmark	8.1	Puerto Rico	21.0**
England and Wales	9.9	Scotland	9.8
Federal Republic of Germany	7.9	Spain	n/a
Greece	15.7**	Sweden	7.3
Hungary	19.0	Switzerland	8.3
Italy	16.1***	United States	10.3
Japan	8.7**		

*Perinatal mortality ratio = (late fetal deaths + deaths <7 days)/live births
n/a indicates not available
**1984, ***1982, ****1987
Data from Demographic Yearbook, selected years (New York, NY: United Nations) and World Health Statistics Annual, selected years (Geneva, Switzerland: World Health Organization).

Table 3.3

Canadian Cesarean Section Rates

	CANADA	NFLD	PEI	N.S.	N.B.	QUE	ONT	MAN	SASK	ALTA	B.C.
1969	5.2	4.3	5.4	5.1	5.0	4.6	**5.9**	4.0	4.4	4.4	6.1
1970	5.6	6.5	4.9	6.2	6.6	5.1	**6.4**	4.4	5.1	5.0	7.0
1971	6.4	7.5	4.0	6.7	6.6	6.1	**6.8**	5.1	5.5	5.3	7.8
1972	7.2	8.4	8.1	8.0	7.2	6.6	**7.6**	6.5	5.9	5.6	8.7
1973	8.8	10.0	8.2	9.0	7.2	7.6	**8.4**	6.9	6.6	6.7	9.4
1974	9.0	12.8	8.2	9.8	7.4	8.3	**9.3**	8.0	7.5	7.8	10.7
1975	9.6	12.8	9.5	10.8	9.0	9.0	**9.7**	8.3	7.8	8.4	11.6
1976	10.8	14.1	13.7	11.1	9.0	9.9	**11.1**	10.0	9.2	9.9	13.2
1977	12.1	14.8	13.7	11.9	11.6	11.5	**12.3**	10.4	11.1	11.0	14.2
1978	13.9	16.0	13.5	13.3	13.6	12.9	**14.8**	12.2	11.8	12.1	16.2
1979/80	14.7	18.3	15.5	15.5	14.6	12.9	**15.9**	14.4	11.8	13.3	16.6
1980/81	15.2	19.5	14.6	16.9	17.0	15.5	**17.1**	14.2	11.4	13.8	17.9
1981/82	16.6	18.9	17.0	16.9	17.0	16.4	**17.4**	14.8	12.6	14.1	18.8
1982/83	17.3	19.1	15.7	17.6	17.4	16.9	**18.5**	14.9	13.8	15.2	18.7
1983/84	18.1	20.2	14.5	18.2	19.1	18.2	**19.0**	14.9	14.3	15.6	20.0
1984/85	18.8	19.7	17.7	18.2	19.6	18.9	**19.8**	14.7	15.9	15.8	20.6
1985/86	18.9	21.4	17.4	18.0	19.0	19.3	**20.2**	14.7	15.9	16.5	19.9
1986/87	18.7	21.0	17.6	19.4	18.8	19.2	**19.8**	13.7	15.0	16.0	19.5

Rate per 100 deliveries
Source: Statistics Canada

Table 3.4

Ontario Trends in Delivery Method

	1984	1985	1986	1987	1988
Ontario Population	8,944,670	9,059,500	9,101,694	9,269,590	9,436,390
Live Births	131,296	133,208	133,882	134,617	137,660
Perinatal Deaths	1,356	1,442	1,389	1,395	1,409
Perinatal Deaths per 1,000 Total Births	10.3	10.8	10.3	10.3	10.2

Data on live births, and perinatal deaths for 1987 and 1988 are still preliminary.

	1984-85	1985-86	1986-87	1987-88	1988-89
# Deliveries	131,310	132,655	134,788	134,633	140,978
# Cesareans	26,178	26,932	27,295	27,167	28,235
% Cesareans	19.94%	20.31%	20.25%	20.18%	20.03%
# VBACS*	495	650	878	1,031	1,482
% Low Forceps	16.5%	14.9%	13.1%	11.5%	10.1%
% Mid Forceps	7.7%	8.1%	8.1%	8.0%	7.4%
% Other Instrumental	0.9%	1.0%	1.0%	1.0%	1.0%
% Vacuum Extractions	1.1%	1.2%	1.4%	1.5%	2.2%
% Spontaneous Vaginal Births	53.8%	54.4%	56.3%	57.7%	59.4%

*There is reason to suspect under-reporting within this category.
Source of data: Hospital Medical Records Institute

with caution. The research group on the Consensus Statement Implementation Project at McMaster University informed the Committee that when medical records were audited in selected hospitals, VBACs were usually found in greater numbers than when calculated from HMRI data.

Table 3.5 displays data from the past five years about the relative contributing diagnoses to the overall cesarean rate. The upper part of the table shows the stability of the contributing diagnoses since the Consensus Conference was held. The indication-specific cesarean rates (middle part of Table 3.5) show a slight decline in the proportion of women with a diagnosis of previous cesarean who have a repeat cesarean, and a slight increase in the proportion with a breech infant who undergo cesarean section. The rates at which diagnoses were made were remarkably constant from 1984-1989 (lower part of Table 3.5).

Table 3.5
Ontario Trends in Cesarean Birth

Contribution of diagnostic indications – % of all cesarean sections

	1984/85	1985/86	1986/87	1987/88	1988/89
Previous Cesarean	39.45%	40.08%	40.10%	39.94%	39.15%
Breech	10.25%	10.57%	10.65%	10.12%	11.14%
Dystocia	18.23%	17.30%	18.37%	17.92%	18.77%
Fetal Distress	8.91%	9.47%	8.93%	9.74%	10.20%
Other	23.16%	22.59%	21.95%	22.28%	20.74%

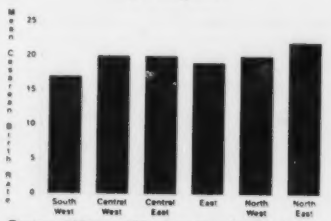
% of women with a given diagnosis who have a cesarean section

	1984/85	1985/86	1986/87	1987/88	1988/89
Previous Cesarean	95.40%	94.34%	92.60%	91.33%	88.18%
Breech	67.70%	68.17%	69.70%	68.13%	70.66%
Dystocia	32.40%	32.57%	32.70%	31.98%	32.46%
Fetal Distress	32.60%	32.96%	31.10%	30.86%	31.51%
Other	6.40%	6.40%	6.80%	6.40%	5.94%

% of all women giving birth with a given diagnosis

	1984/85	1985/86	1986/87	1987/88	1988/89
Previous Cesarean	8.3%	8.6%	8.8%	8.9%	8.9%
Breech	3.0%	3.2%	3.1%	3.0%	3.2%
Dystocia	11.2%	10.8%	11.4%	11.4%	11.6%
Fetal Distress	5.4%	5.8%	5.8%	6.3%	6.5%
Other	72.1%	71.6%	71.0%	70.4%	69.9%

Figure 3.2
Mean Cesarean Birth Rate By Region



Review of Maternal/Newborn Hospital Services in Ontario, 1990, Ministry of Health

Table 3.6
Cesarean Birth Rates in Health Regions since 1984

	South West	Central West	Central East	East	North West	North East
1984/85	18.8	19.5	20.9	19.1	20.2	19.4
1985/86	18.7	19.4	21.1	19.9	20.8	21.3
1986/87	17.9	19.8	20.9	20.1	20.3	21.6
1987/88	17.7	20.1	20.1	19.5	19.7	22.3
1988/89	17.8	20.2	20.6	19.1	19.5	22.1

Dates are reported for April 1 – March 31 of the years listed

[1]Data for this part of the report were obtained from the Hospital Medical Records Institute and from the Ministry of Health Survey of Ontario hospitals. Survey data are self-reported by hospital personnel.

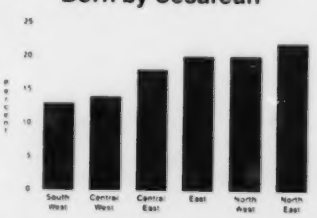
Variation in Cesarean Birth Rates within Ontario[1]

The 1988/89 mean cesarean birth rate in each of the six health regions is shown in Figure 3.2. The largest difference is between the southwest and northeast regions. This variation among regions has become more apparent when rates since 1984/85 are examined (See Table 3.6). Also of interest is the more pronounced variation of regional cesarean section rates for babies of >2500 g birthweight (Figure 3.3).

Differences among regions are also evident in the rates of cesarean section for specific indications (Table 3.7). To illustrate, there is wide variation in the frequency with which cesarean section is used to treat fetal distress (17% to 55% of diagnosed cases). There is a corresponding variation in the frequency of the fetal distress diagnosis itself across regions. For example, in the southwest, the diagnosis occurs in 3.5% of births compared to 9% in the eastern region.

There are of course large differences in the geography, population, number of hospitals and personnel in the various regions. Tables 3.8, 3.9(a) and 3.9(b) show some of these differences. While Tables 3.9(a) and 3.9(b) are not

Figure 3.3
Percentage of Babies >2500 g Born by Cesarean



Review of Maternal/Newborn Hospital Services in Ontario 1990, Ministry of Health

region-specific, they show the changes occurring in small hospitals. A majority of hospitals with up to 1,000 births annually report a decreasing number of family physicians attending births, whereas the majority of hospitals reported no change in obstetrician numbers.

All these factors may influence the need for and ability to perform cesarean sections. For example, the rate of cesarean section rises with maternal age (see Table 3.10). A region with a greater proportion of births to women over age 34 could have an overall higher rate. No single factor, however, easily explains the observed differences among regions.

The variation among hospitals is displayed in Figures 3.4 to 3.9. For each region, the rate for each hospital is shown with hospitals arrayed on the graphs from smallest number of annual births to largest number. These figures show that there is no consistent relationship between size of maternity services and cesarean birth rates. High and low rates are found in large and in small volume services. Appendix IV contains the cesarean rate for 1988/89 for each Ontario hospital.

Since number of births per year is related to availability of resources and therefore to the risk level of women and newborns cared for in the hospital, it is somewhat surprising that the variation in rates in relation to hospital size is so marked.

Another way of examining rates across different types of hospitals is displayed in Figure 3.10. The comprehensiveness of services varies with whether a hospital is a community (Level I), district (Level II), modified regional or regional centre (Level III). Regional centres are expected to care for mothers and babies most at risk and might be expected to have the highest cesarean rates. In fact, rates are highest in modified regional centres, and rates in community hospitals are higher than in district centres.

Table 3.7

% of Women with Given Conditions Who Have a Cesarean Section

	South West	Central West	Central East	East	North West	North East
Fetal Distress	43	29	35	17	43	55
Dystocia	35	28	36	26	27	46
Breech Presentation	56	70	71	81	71	81
Previous Cesarean	86	87	91	82	90	95
Other	5	6	6	6	6	8

Table 3.8

Descriptive Information about Health Regions

	South West	Central West	Central East	East	North West	North East
Population	1,292,067	1,762,782	3,937,399	1,271,071	231,378	606,997
% Women age 15-44	23.08%	23.69%	25.31%	24.40%	23.26%	21.89%
% of Women giving birth at age < 20	6.4%	5.4%	4.5%	5.2%	10.6%	9.1%
% of Women giving birth at age > 35	4.9%	6.4%	9.4%	6.9%	4.6%	3.9%
Total Births	18,752	26,522	63,743	18,441	3,622	8,389
Number of Hospitals with Maternity Services	31	23	42	23	12	23

Source: Ministry of Health

Table 3.9(a)

Change in Number of Family Physicians Attending Births

Hospitals by Number of Births

Change	0-500	501-1000	1001-1500	1501-2000	>2000	Total
+6 to 10	0	1(7.8%)	0	0	1(6.3%)	2(1.7%)
+1 to 5	15(22.1%)	2(15.4%)	0	1(14.3%)	0	18(15.4%)
0	17(28.0%)	1(7.8%)	0	0	3(18.8%)	21(17.9%)
-1 to 5	33(48.5%)	4(30.8%)	4(30.8%)	1(14.3%)	3(18.8%)	45(38.5%)
-6 to 10	3(4.4%)	2(15.4%)	5(38.5%)	3(42.9%)	2(12.5%)	15(12.8%)
>-10	0	3(23.0%)	4(30.8%)	2(28.6%)	7(43.8%)	16(13.7%)
Total	**68**	**13**	**13**	**7**	**16**	**117***

*30 no response

Source: Review of Maternal/Newborn Hospital Services in Ontario, 1990, Ministry of Health

Table 3.9(b)

Change in Number of Obstetricians Attending Births

Hospitals by Number of Births

Change	0-500	501-1000	1001-1500	1501-2000	>2000	Total
+1 to 3	5(7.5%)	5(35.7%)	8(57.1%)	4(50.0%)	4(19.0%)	26(21.0%)
0	61(91.0%)	6(42.9%)	3(21.4%)	1(12.5%)	7(33.3%)	78(62.9%)
-1 to 5	1(1.5%)	1(7.1%)	3(21.4%)	3(37.5%)	10(47.6%)	18(14.5%)
>-5	0	2(14.3%)	0	0	0	2(1.6%)
Total	**67**	**14**	**14**	**8**	**21**	**124***

*47 no response

Source: Review of Maternal/Newborn Hospital Services in Ontario, 1990, Ministry of Health

Table 3.10

Ontario Age-Specific Cesarean Section Rates 1988/89

≤19 yrs	20-24	25-29	30-34	35-39	≥40 yrs
15%	17.6%	19.4%	21.6%	26.4%	30.3%

Figure 3.4– South West Region of Ontario

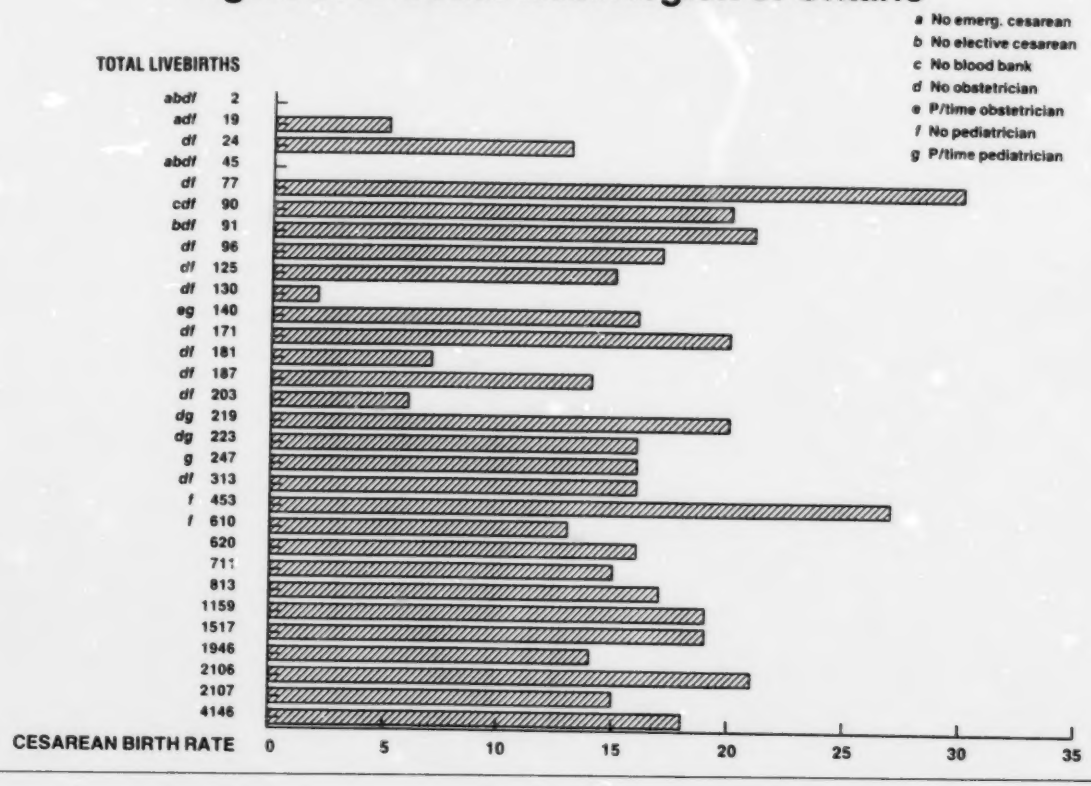


Figure 3.5 – Central West Region of Ontario

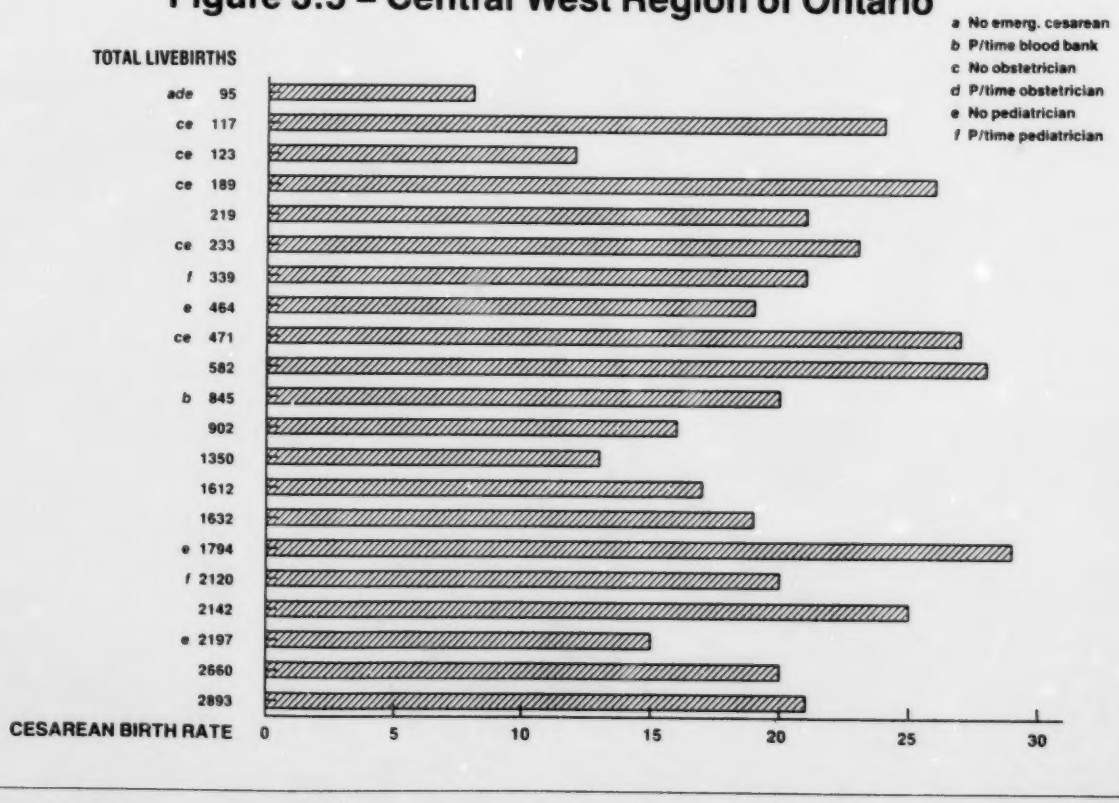


Figure 3.6 – Central East Regions of Ontario

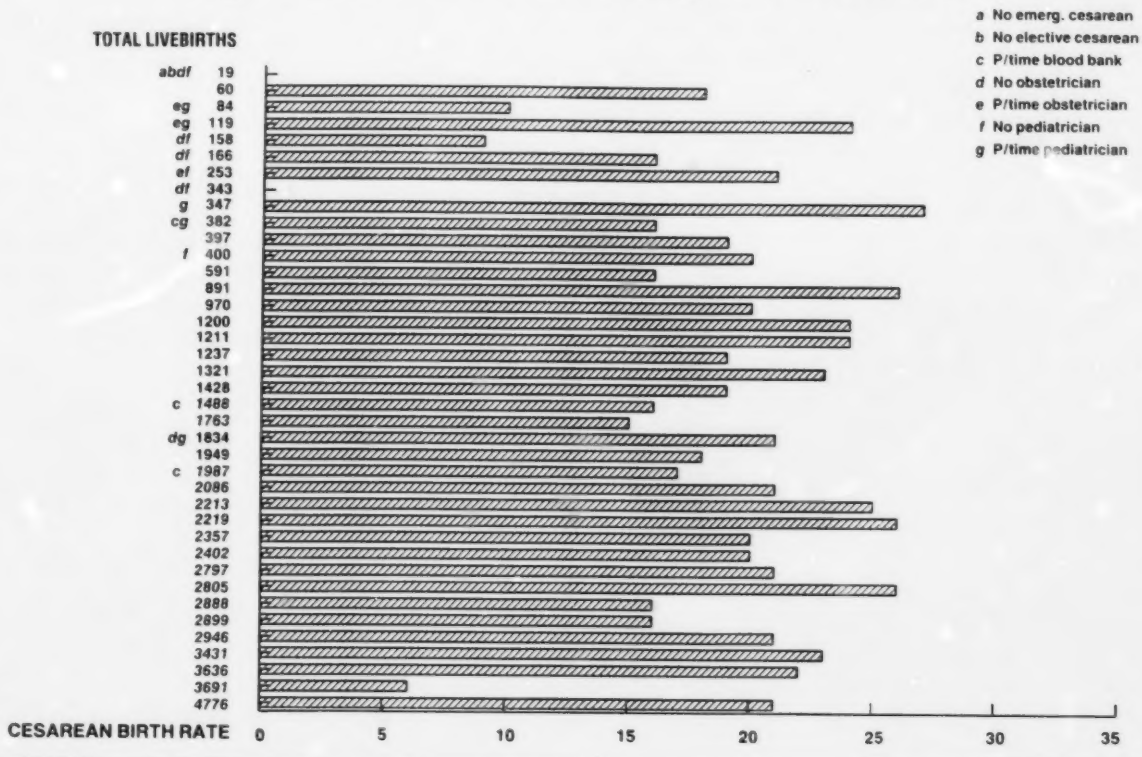


Figure 3.7 – East Region of Ontario

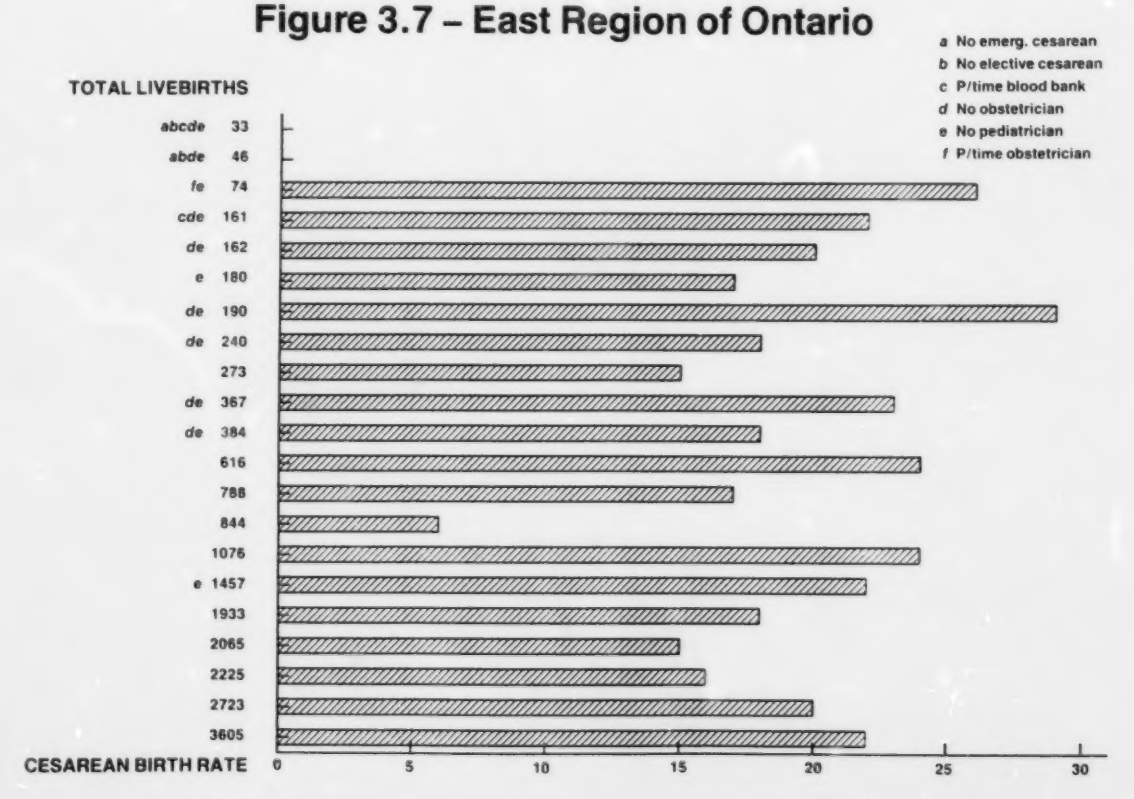


Figure 3.8 – North East Region of Ontario

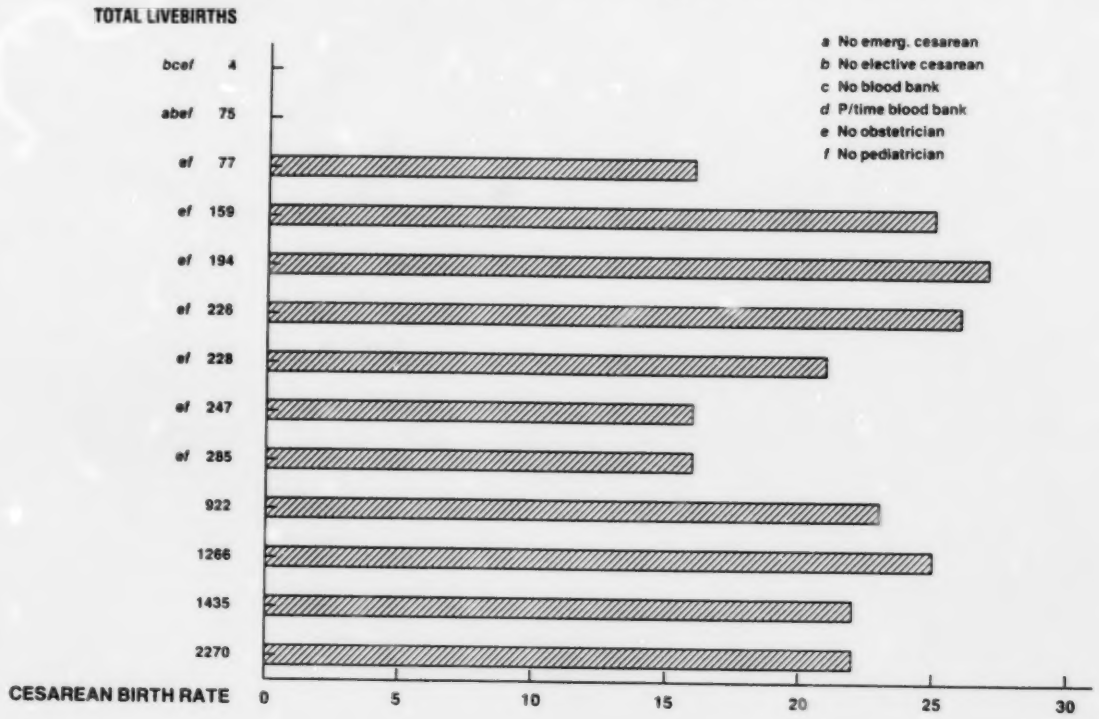


Figure 3.9 – North West Region of Ontario

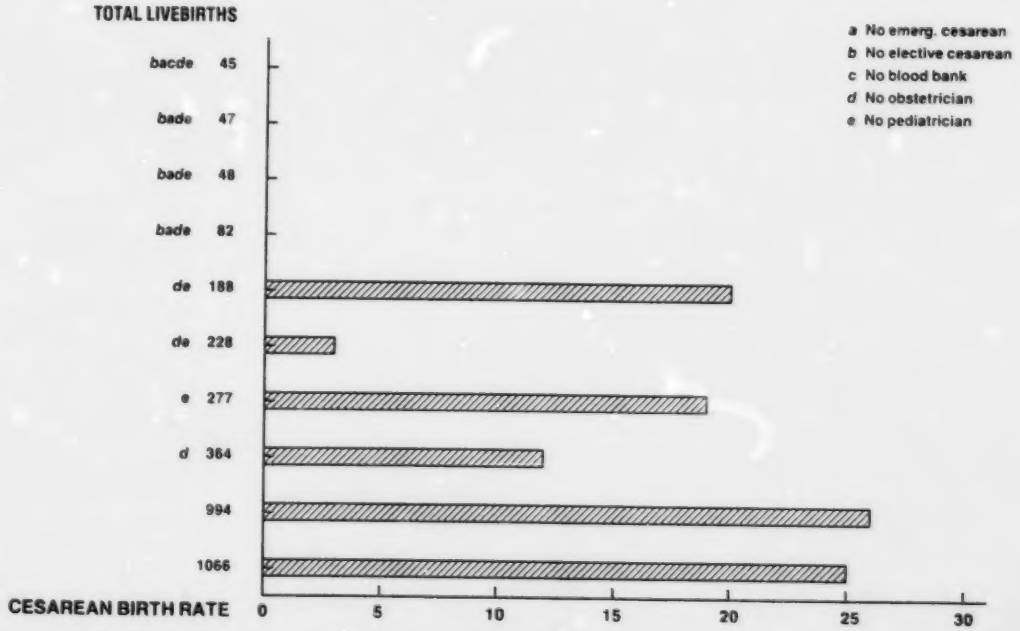


Figure 3.10

% of Cesarean Births

Review of Maternal/Newborn Hospital Services in Ontario, 1990, Ministry of Health

A number of resource-related aspects of hospital facilities are also shown on Figures 3.4 to 3.9. Eleven hospitals that reported not being prepared for emergency cesarean sections all had rates below 10% and were hospitals with a small number of births. Eleven hospitals reported not being able to offer elective cesarean section, and 10 of them also had rates below 10%. Nine hospitals reported that blood bank services were unavailable 24 hours per day; six of these reported performing cesareans in 1988/89.

The availability of obstetricians and pediatricians is also shown in the Figures. As expected, they are more likely to be located in larger volume services, but cesarean rates in these hospitals show similar variability to rates in hospitals without specialists.

Influence of Specific Practices

To further examine the variation in cesarean rates among hospitals, several care practices were examined in relation to cesarean birth rates.

Hospitals reported the time needed to initiate a cesarean section once a decision is made that surgery is needed. Table 3.11 shows there is a trend of decreasing cesarean rates with increasing time to begin the procedure. This is an expected relationship and seems related to resource availability. The data show many hospitals require more than 30 minutes to initiate a cesarean section. Three hospitals with start-up times much in excess of 60 minutes (two at 90 minutes; one at 160) did report cesarean births in 1989/90.

Table 3.11

Cesarean Birth Rate Cross-tabulated Against Estimated Time Needed to Institute Cesarean

	Time to mount a c/s (min)				
CSBR	<15	15-29	30-44	45-59	≥60
<10%	4(9.1%)	1(3.1%)	4(11.4%)	0	3(60.6%)
10-15%	1(2.3%)	1(3.1%)	5(14.3%)	0	1(20.0%)
15-20%	13(29.5%)	12(37.5%)	11(31.4%)	0	0
20-25%	18(40.9%)	13(40.6%)	9(25.7%)	0	1(20.0%)
25-30%	8(19.2%)	5(15.6%)	6(17.1%)	0	0
Total	44(100%)	32(100%)	35(100%)	0	5(100%)

(29 hospitals did not respond to one or both of the above questions)

Source: Maternal/Newborn Hospital Survey, 1990, Ministry of Health

Other practices/policies thought to be possible influences on cesarean rates demonstrated no consistent pattern of relationship. Appendix V contains Tables that indicate the following are not directly associated with cesarean rate:

i) policies regarding how long a woman may labour in second stage;
ii) whether cervical dilation is graphically plotted in labour;
iii) whether 30-minute fetal heart rate tracings are obtained on admission to the labour floor;
iv) whether there is a policy regarding mobility in labour.

The difficulty with examining these practices individually is that each is only one component of a complex set of care practices that can influence the method of birth. It is unlikely that as a single influence any of the items would have an impact on the cesarean rate of a hospital.

A practice that did exhibit a relationship was the use of continuous electronic fetal heart rate monitoring. A higher proportion of hospitals that did not use continuous monitoring had lower cesarean rates. (See Table 3.12.) However, the small number of hospitals that either monitored all women or no women do not make this a straightforward interpretation. It is likely that both the use of electronic monitoring and the frequency of cesarean birth are influenced by the availability of resources and the risk status of the women cared for.

Flexible family-centred care policies of a hospital were related to cesarean rates. Interestingly, there was a trend toward higher cesarean rates in hospitals which routinely separate mothers and babies for an observation period and in hospitals which limit the presence of significant others for birth. (See Tables 3.13 and 3.14.) The interpretation of these associations is not that either practice necessarily directly influences cesarean rates, but these aspects

Table 3.12

Cesarean Birth Rate Cross-tabulated Against Use of Continuous Electronic FHR Monitoring

	All Women	Selected Women	No Women
<10%	0	8(7.8%)	7(50.0%)
10-15%	0	5(4.9%)	1(7.1%)
15-20%	3(50.0%)	33(32.4%)	5(35.7%)
20-25%	3(50.0%)	37(36.3%)	1(7.1%)
25-30%	0	19(18.6%)	0
Total	6(100%)	102(100%)	14(100%)

(25 hospitals did not respond to one or both of the above questions)

Source: Maternal/Newborn Hospital Survey, 1990, Ministry of Health

of hospital policy reflect an overall approach to labour and birth that does influence cesarean rates.

In summary, this chapter has presented information that shows Canada and Ontario have higher rates of cesarean birth than many other parts of the world. There is no evidence available to show that perinatal mortality is improved because of the rate. Ontario rates have shown almost no change since the 1985 Consensus Conference on Aspects of Cesarean Birth despite the distribution of practice guidelines. The considerable variation among regions and hospitals is not easily explained and appears to be associated with multiple factors.

Table 3.13

Cesarean Birth Rate Cross-tabulated Against Whether Baby and Mother Separated for Observation Period

	No	Yes
< 10%	8(19.0%)	11(12.9%)
10-15%	3(7.1%)	4(4.7%)
15-20%	16(38.1%)	27(31.8%)
20-25%	14(33.3%)	28(32.8%)
25-30%	1(2.4%)	15(17.6%)
Total	42(100%)	85(100%)

(20 hospitals did not respond to one or both of the above questions)

Source: Maternal/Newborn Hospital Survey, 1990, Ministry of Health

Table 3.14

Cesarean Birth Rate Cross-tabulated Against Whether Significant Others Permitted to Attend Vaginal Births

	Encouraged	Limits	Not Encouraged
< 10%	15(13.6%)	5(26.3%)	0
10-15%	7(6.4%)	1(5.3%)	0
15-20%	37(33.6%)	5(26.3%)	0
20-25%	39(35.5%)	2(10.5%)	0
25-30%	12(10.9%)	6(31.6%)	1(100%)
Total	110(100%)	19(100%)	1(100%)

(17 hospitals did not respond to one or both of the above questions)

Source: Maternal/Newborn Hospital Survey, 1990, Ministry of Health

Leading Indications for Cesarean Section

Chapter 4

The Ontario data throughout the 1980s consistently show that previous cesarean section and dystocia are the leading indications for cesarean births, accounting for nearly 60% of all cesareans. Accordingly, the Committee reviewed in considerable detail the information about these indications.

Previous cesarean section

The dictum "once a cesarean, always a cesarean" was introduced and advocated in North America by Craigin[26] in 1916. Primary cesareans for reasons other than severe pelvic contracture were unusual, and since only classical incisions were performed, the dictum was reasonable. Adoption of the transverse lower segment incision began very slowly in the 1920s, and it now accounts for almost all cesareans performed. Despite experience from at least the 1950s in British and North American obstetrics that vaginal delivery could safely follow this incision, the dictum from 1916 has continued to be regarded as stated policy by many[41].

For the past several years, almost 40% of all cesareans in Ontario were performed for the indication of previous section. In 1988/89, 88% of women with a previous cesarean were delivered by repeat section. Variation among regions was from 82% to 95% (see Table 4.1).

A review of the English-language medical literature on VBAC was published in 1982[100]. Twenty-five studies were analyzed, with a total of over 6,000 planned labours. In 1985, a review of subsequent VBAC literature was completed[49]. It contained a further 21 studies totalling 5,356 planned labours. The Committee's review of literature from 1985-1990 showed an additional 17,586 planned labours after cesarean have been reported from developed countries (see Appendix VI for tabulation and sources). Thus, the experience with planned labour is now very substantial.

Of the planned labours reported above, vaginal births occurred overall in 77% of women (studies

Table 4.1

Frequency of Previous Cesarean Condition and Use of Repeat Cesarean

	% of Women Giving Birth Who Have Previous Cesarean	% of Women with Previous Cesarean Who Have a Repeat Cesarean
South West	8.8	85.6
Central West	9.2	86.5
Central East	8.7	91.0
East	8.8	82.0
North West	9.1	89.4
North East	8.9	94.8

Source of data: HMRI

vary from 59-100%) with good maternal and infant outcomes[44, 54, 67, 112, 116, 134, 179]. However, despite the evidence that VBAC is safe for mother and infant, the practice is not widespread in North America, including Ontario.

The Consensus Statement on Indications for Cesarean Section[25] recommended a "trial of labour" in a woman with one low transverse cesarean section, a singleton, vertex presentation and no other indications for cesarean section. The more recent American College of Obstetricians and Gynaecologists (ACOG) guidelines recommend that the concept of routine repeat cesarean birth should be replaced by a specific indication for a subsequent abdominal delivery and in the absence of a contraindication, a woman with one previous cesarean delivery with a low transverse incision should be counselled and encouraged to attempt labour in her current pregnancy.[3]

A recent review tabulates outcomes for labour after a previous cesarean, including maternal morbidity and mortality, uterine rupture or dehiscence, and perinatal morbidity and mortality[41]. Evidence suggests the risk of a mother dying during a cesarean, though small, is two to four times the risk associated with a vaginal delivery. No maternal death as a result of a ruptured uterus during labour in a woman with a previous low segment incision has been reported for decades in industrialized societies[109].

Most forms of maternal morbidity are higher with cesareans due to risks from anaesthesia, operative injury, febrile morbidity, effect on subsequent delivery, as well as psychological risk[41, 109]. All the reviewed VBAC studies reported maternal morbidity to be equal to or less than that of repeat cesarean section.

Evidence suggests uterine rupture in association with VBAC is rare in women with low transverse scars. The report of the National Consensus Conference on Aspects of Cesarean Birth[25] reported the risk of uterine rupture during labour after one previous cesarean section to be 0.2%. It is important to make the distinction between uterine rupture and scar dehiscence. Complete uterine rupture involves the entire thickness of the uterine wall, is sudden, explosive and associated with pain, blood loss, and fetal and maternal morbidity. It occurs most often in the unscarred uterus, though it does happen in women who have had a prior classical cesarean section. It is extremely rare in women with a low transverse cesarean scar. A uterine dehiscence is a partial separation of the uterine wall at the site of a former incision and has minimal fetal and maternal morbidity. This distinction is often not made in the literature[19].

In a summary of studies, Enkin[41] reports a uterine rupture/dehiscence rate of 1.5% in 2,027 elective repeat cesareans and 0.8% in 4,153 labours. Most of these ruptures/dehiscence were minor in nature, with no serious sequelae. At least four occurred in women who had classical incisions. Two women in the labour group and one in the elective cesarean group required a hysterectomy for uterine rupture.

Of the more than 17,000 planned labours after cesarean section reported from developed countries since 1984, 37 scar ruptures have occurred for a rate of 0.21%. Thirty-four of these ruptures were specifically classified as low transverse. In this literature 70 dehiscences were reported; 20 events were unclearly classified as to rupture or dehiscence. (See Appendix VI.)

Postpartum examination of the previous cesarean scar is routinely practised in some settings[17]. No studies have shown this to be of any benefit. It is a painful procedure for women who are not anaesthetized and there is a risk of introducing infection or of "converting a dehiscence into a larger rupture"[41].

Concerns are sometimes expressed about the safety of VBAC in a post-term pregnancy or with a large infant. The only study examining post-term VBAC, concluded post-term pregnancy is not associated with an increased risk of uterine rupture and should not be considered a contraindication to labour[178]. Porreco and Meier[139] comment that patients with a prior cesarean section who proceed beyond their expected date of delivery should be managed as any other women in this situation, with appropriate fetal surveillance and induction of labour when indicated. Flamm and Going[51] report a 55% VBAC rate among 301 women with large infants (over 4000 grams) who experienced labour. Phelan et al[135] reported a vaginal birth rate of 67% among 140 women with large infants. Neither study reported adverse maternal or fetal outcomes, and both concluded elective cesarean section was not appropriate for a suspected large infant (in non-diabetic women).

The risks of rupture or dehiscence for women with other than low transverse uterine incisions are not clearly known. Classical (vertical) incisions are presumed, on the basis of information from 1957[33], to confer greater risk. Women with an unknown scar or with a low vertical incision are included in several VBAC studies and the rates of rupture/dehiscence are similar to low transverse, but the experience is very limited[54, 119, 143].

Studies to date show no increase in perinatal morbidity and mortality rates in VBAC groups compared with elective cesarean section groups[41, 44, 54, 67, 112]. It is important to note that these comparisons mean little if groups are not equivalent. The decision to perform a cesarean section or encourage women to labour may reflect differences in the condition of the fetus. Nevertheless, the weight of evidence suggests that lower maternal morbidity and apparently equivalent perinatal outcomes will result

from policies to promote vaginal delivery after previous cesarean section.

Dystocia

Many terms are used by practitioners and researchers to describe abnormal labour progress. Labour inertia, cephalo-pelvic disproportion, arrested labour, obstructed labour, uncoordinated labour, prolonged labour and dystocia can all be found in medical charts and published literature. This variety of terms accentuates the lack of clear criteria to define "abnormal" progress.

Because the terms do not have distinct definitions, it is very difficult to make comparisons of the frequency with which specific conditions occur. Some studies report rates of cesarean birth related to a diagnosis of cephalo-pelvic disproportion. Notzon[124] states that this diagnosis was made for 5% of United States births, but for only 0.4% of births in Sweden.

Ontario rates for cesarean births are calculated for dystocia. This is a general diagnostic category and includes the specific diagnoses of disproportion, inertia, prolonged or obstructed labour, etc., that appear on medical records. In 1988/89, 12% of women giving birth were in this category. Across the regions of the province, the proportion of all labours with a diagnosis of dystocia varied from 8% to 16% (see Table 4.2). Because abnormal progress is much more likely to occur in first labours, this overall figure may represent 20-30% or more of first labours. Indeed, an investigation of dystocia in Ottawa[160] showed that 30% of 3,887 primiparous women who had labour were given a diagnosis of dystocia or disproportion.

Women with dystocia are at increased risk of cesarean birth, and dystocia is second only to repeat cesarean as an indication. It is the most common reason for a *primary* cesarean. Overall, in Ontario (1988/89) 33% of women with dystocia have a cesarean birth. Again, there is considerable variation across regions, varying from 26% to 46% (See Table 4.1). The high frequency of the diagnosis and the consequent surgical treatment combine to produce the prominent place of dystocia in the current picture of cesarean birth.

Table 4.2

Frequency of the Diagnosis of Dystocia and Cesarean Section for Its Treatment for Regions of Ontario (1988-89)

	% of labours with diagnosis of dystocia	% with diagnosis who are treated with cesarean
South West	9.3%	35%
Central West	12.7%	28%
Central East	11.3%	36%
East	15.5%	26%
North West	10.4%	27%
North East	7.7%	46%

Source of data: HMRI

Diagnosis of Dystocia

The Consensus Panel on Cesarean Birth[25] stated that it was not possible to make recommendations about the best diagnostic criteria for dystocia. It did, however, offer working guidelines: a woman must be in established labour; the latent phase of labour is not considered established labour; there must be at least three centimetres of cervical dilation, and a rate of dilation of less than half a centimetre per hour for at least four hours after three centimetres dilation has been achieved.

Evidence that these recommendations are not being applied was reported by Stewart et al[160]. Her investigation of Ottawa hospitals showed that 35% of the diagnoses of dystocia were made in the latent phase of labour, and 41% of the cesarean sections for dystocia were done in the latent phase.

It is generally accepted that a partogram is the best method to diagnose dystocia[56]. The differences among the many partograms relate primarily to the assessment of the latent phase[56], which has been characterized as a poorly understood phase that varies greatly from woman to woman[40]. Data from the survey of Ontario hospitals indicate that only about 50% of hospitals reported routine use of a graph to chart the progress of labour.

Care of Women in Labour

In an effort to reduce the frequency of cesarean section for dystocia, attention has focused on the protocols developed in Dublin, Ireland, for the active management of labour. At the National Maternity Hospital in Dublin all women receive prenatal preparation about labour care, careful assessment and admission to the labour ward only when labour is well established, one-to-one constant attendance, ambulation, frequent auscultation of fetal heart rates and cervical examination at specific intervals. The circumstances for artificial rupture of membranes and use of a standardized protocol for oxytocin are prescribed. The resulting cesarean birth rate is about 7%[127, 128].

A uniform policy of amniotomy and oxytocin use for non-progressive labour was evaluated in Moncton, New Brunswick[1]. Primary cesarean rates dropped from 13% to 4.3% in nulliparous women over 36 weeks gestation with a single fetus in vertex position. Other studies are ongoing in Canada, including an assessment of protocols for oxytocin use[86] and the role of amniotomy[56].

Questions have been raised about other aspects of labour management. A number of trials looked at the effect of social support on labour[94, 97], and found

that it can significantly decrease the duration of labour, as well as the frequency of interventions. Thorp et al[164] found a strong association between epidural use and increased cesareans, but further studies are needed to interpret this association. Prelabour rupture of membranes at term has been associated with an increase in cesarean section when treated with early induction[96] Stewart et al[160] also found that induction contributed to cesareans being performed in the latent phase of labour.

These studies are important to the further consideration of aspects of labour management that may decrease the frequency of dystocia and the consequent frequency of cesarean section as its treatment. Consideration of diagnostic criteria is also required. If 30% of primiparous women[160] are diagnosed as having abnormal labour, then the criteria for determining "normal" do not appear to provide for women's actual variation in labour progress.

It is essential for future change that cesarean sections for dystocia be reduced. A lowering of the primary cesarean birth rate will have a compounding effect, since fewer women will then face the possibility of a repeat cesarean.

Review of Indications for Cesarean Section

Chapter 5

The Committee undertook a detailed review of the Consensus Statement to determine whether the practice guidelines required updating because of information that has accumulated since the National Consensus Conference was convened. Eight areas were identified by the Committee for potential revision.

Consensus statement

To assist the review, the Committee asked the following organizations for comments on those eight areas:

- Association of Ontario Midwives
- Childbirth Nurses Interest Group of the Registered Nurses' Association of Ontario
- College of Family Physicians of Canada, Ontario Chapter
- College of Physicians and Surgeons of Ontario
- Ontario Hospital Association
- Ontario Medical Association
- Ontario Nurses' Association
- Society of Obstetricians and Gynaecologists of Canada, Ontario Section
- VBAC Association of Ontario

Responses were received from all the groups. Their views were considered in the review of current information and the formulation of recommendations.

The areas of the Consensus Statement identified for revision are described in detail in the following sections.

A. Designation of appropriate hospital facilities

Although uterine rupture may be catastrophic for a woman and her infant, it occurs much less frequently than other acute obstetric emergencies. The 1985 Consensus Panel recommended that hospitals providing obstetric care should ensure the availability of all necessary resources to begin an emergency cesarean section within approximately 30 minutes for any woman in labour, including those who labour after a previous cesarean section.

Despite this recommendation, many hospitals that undertake cesareans do not provide for labour and vaginal delivery following a previous cesarean section. The risk of an emergency cesarean being required for uterine rupture is smaller (0.09%) than the risk of needing an immediate cesarean for other causes (2.7%)[27] Since these risks are faced in any hospital obstetric service, caring for women in labour after a previous cesarean poses no additional requirement above and beyond the response needed for other unanticipated problems.

While the Committee recognized that small, isolated hospitals may have added considerations regarding available surgical services or maternal transport, ***the Committee concluded that all obstetrical services which have the capacity to carry out emergency cesarean sections can safely care for women in labour after a previous cesarean with no increase in resources.***

B. Labour after more than one previous cesarean section

The Consensus Panel stated that in 1985 there were insufficient data to conclude that labour after more than one previous cesarean section was a reasonable option[25] The Committee reviewed 18 reports published from 1985 onward.

Phelan et al[133] reported that of 501 women with more than one previous cesarean who underwent labour, 69% gave birth

vaginally. The Committee's review of studies showed that of 1,124 women who laboured after more than one cesarean, 70% had a vaginal delivery. Of the total labours, about 70% of the women had two previous cesareans. Their VBAC rate was also 70%. These VBAC rates are similar to those of women with only one previous cesarean. The estimated rate of uterine dehiscence appears higher (1.8%) than that reported for one previous scar, but there was no increase in the rate of uterine rupture (0.1%). (See Appendix VI.)

Authors examining this issue reached the conclusion that labour in this situation appears to be a reasonable option, and treatment should not differ from that given women with one previous cesarean section[41, 126, 133].

The 1988 ACOG[3] guideline for vaginal birth after more than one previous cesarean section is:

> A woman with two or more previous cesarean deliveries with low transverse incisions who wishes to attempt vaginal birth should not be discouraged from doing so in the absence of contraindications.

The Committee agreed the data on outcomes of labour after more than one previous lower transverse section are encouraging. In view of the accumulated experience, ***the Committee recommends that the management decision about labour and vaginal birth after more than one previous cesarean section be between a woman and her care provider***.

C. The use of oxytocin during labour after a previous cesarean section

The Consensus Panel did not feel there was firm information about the use of oxytocin and suggested oxytocin stimulation be used with caution until further supportive data became available, and that there were insufficient data to comment on induction of labour.

Since 1985, over 20 published reports have provided information about the use of oxytocin during labour after a previous cesarean section. (see Appendix VI.) The uterine rupture rate in the over 3,300 women who received oxytocin was 0.4%. Dehiscences were incompletely reported, but based on 1,311 women, the rate was 1.8%. Recent reports of large series of women with a previous cesarean labouring with oxytocin have concluded that the incidence of uterine scar dehiscence or rupture is not importantly increased[52, 116, 134] and that judicious use of oxytocin is safe in women with a previous low transverse scar. Smaller studies have reached the same conclusions[8, 50, 82, 83, 139].

The Committee concluded that the current evidence about oxytocin use remains incomplete. The majority of the studies do not make a distinction between oxytocin use for induction and augmentation of labour. Given the experience to date, however, the Committee recommends that in situations where oxytocin use is considered, the presence of a lower segment transverse scar need not be a major influence on the decision. The Committee encourages further research about the impact of oxytocin use for induction and augmentation of labour in women with previous cesarean section.

D. Labour with multiple gestation or breech presentation after a previous cesarean section

The Consensus Statement noted there was insufficient evidence to make a recommendation regarding labour for women with twins or a breech presentation in the subsequent pregnancy.

A recent paper by Strong et al[162] reported that 45% of women with twins laboured and 72% of these had a vaginal birth. There were 56 women in the study, and no significant differences in maternal or fetal morbidity or mortality. However, this one study represents over one-third of all VBACs with twins, as there have been only 95 such VBACs reported in the literature. Although it appears multiple pregnancy may not add greatly to the risk of labour, there is not yet enough evidence to recommend labour for all women in this situation. The management decision should be left to the woman and her physician.

Over 200 VBACs with breech presentation have been reported in medical literature. Two recent studies specifically reviewed women with a term breech presentation after a previous cesarean birth[130, 149]. Both concluded that in selected breech pregnancies after a previous cesarean, vaginal birth is an acceptable alternative, conferring no added risk to mother or child. The Committee considered it important that more evidence supporting this conclusion be accumulated before a definitive recommendation is made. The management decision should be left to the woman and her physician.

The Committee also recognized current training of physicians may not include vaginal delivery of a term breech infant. A training program is needed to ensure that physicians acquire and maintain the skills necessary to attend a breech birth.

E. Requirement for an antenatal and intrapartum notification/consultation with an obstetrician/surgeon

The Consensus Statement recommended antenatal evaluation by an obstetrician and intrapartum notification and/or consultation with the obstetrician/surgeon and anaesthetist for labour after a previous cesarean birth.

It is difficult to find empiric evidence to either support or reject the requirement for an antenatal consultation for a woman with a previous cesarean section. It is the opinion of the Committee that the primary care provider should determine the appropriateness of labour through review of the woman's cesarean section operative record. Documentation of location of the incision and indication for the

previous surgery is mandatory.

The Committee concluded there should be no mandatory requirement for primary care providers to obtain a consultation when there is documentation of a lower segment transverse cesarean section in a woman with no identifiable risk. The primary care provider must ensure that available resources for intrapartum care are in place, as is required for any woman in labour.

F. Criteria for diagnosis of dystocia

The Consensus Statement criteria for dystocia include a requirement for established labour (at least three centimetres dilation) and less than half a centimetre per hour cervical dilation over the four hours following establishment of labour[25]. The Committee supports these criteria for the diagnosis of dystocia as well as the use of a partogram as a labour management tool for physicians, nurses and other primary care providers.

G. Efficacy of external cephalic version (ECV)

The Consensus Panel recommended randomized controlled trials to determine the efficacy and safety of external cephalic version, in decreasing the incidence of cesarean section for breech presentation[25].

In 1988/1989 over 70% of breech presentations resulted in cesarean sections, and over 11% of all cesareans were performed for the indication of breech presentation. External cephalic version is a means of decreasing the incidence of breech presentation and thus the number of cesareans.

According to data contained in the Oxford Database of Perinatal Trials[81] and compiled for the Committee by Enkin[42], ECV before term is ineffective. ECV at term is more difficult, but it is highly effective in decreasing the incidence of breech presentations and therefore the incidence of cesarean section for this indication. ECV at term has not been associated with an increase in perinatal morbidity. (See Appendix VII for tables.)

The Committee recommends that external cephalic version be considered, especially at term, in view of its demonstrated effectiveness in randomized clinical trials. The Committee encourages the development of educational programs to teach this procedure and the indications for its use at the post-graduate level and through continuing education.

Influence of Non-Medical Factors

Chapter 6

Chapter 3 presented current Ontario data on the variation in cesarean section rates among countries, provinces, regions within Ontario and hospitals within each region. The medical literature also shows significant differences in rates of cesarean sections among physicians within an individual hospital[62, 32]. Some of the variation may be explained by specific pregnancy and labour characteristics that affect method of delivery, but individual practice preferences seem to account for much of the variation.

Ideally, practice guidelines and clinical policies that are based on current research evidence should reduce variation due to personal preferences. However, it is clear from the literature, and the variation in overall and indication-specific cesarean section rates, that practice preferences are not easily and quickly altered by research evidence.

Non-medical or social factors help to explain why guidelines have not reduced variation in rates. These include fear of litigation, individual practice style, practice setting, convenience (for women, families and physician), financial incentives, available resources and women's preferences.

Physicians' Fear of Litigation

According to a number of researchers, clinicians increasingly claim fear of litigation to be a primary influence on their decisions to perform cesarean sections[107, 62, 108, 68]. The rate of litigation varies between jurisdictions, depending upon the society's propensity to sue. Physicians' fears of litigation appear to be a more important influence than the reality of the threat.

The medical malpractice crisis in the United States began in the mid-1970s with significant increases in the frequency of claims, size of awards and insurance premiums. This crisis was not shared by Canadian physicians. Unlike the United States, where physicians are covered by for-profit commercial insurers, most Canadian physicians are members of the Canadian Medical Protective Association (CMPA), which offers a non-profit, professional self-protection service at relatively low cost. CMPA represents almost all doctors threatened with litigation and will fight all claims rather than settle (unless gross malpractice was apparent), a strategy seen to be a deterrent to further litigation against members. Another aspect that explains some of the difference in the level of litigiousness between the two countries is the rarity of a jury trial in medical malpractice cases in Canada. Jury trials are common for malpractice cases in the United States.

By the late 1980s, the medical profession perceived the medico-legal situation in Canada to be reaching crisis levels. Both the medical profession and the judiciary voiced concerns about the deleterious effects of increased litigation on the health care system, when at the same time those in need of compensation received little benefit. In 1987 the Deputy Ministers of Health in Canada appointed J. Robert S. Prichard, then Dean of the Law School at the University of Toronto, to chair a federal/provincial/territorial review on liability and compensation issues in health care.

The Cesarean Birth Committee reviewed Prichard's findings and recommendations in its consideration of the effect of litigation on physicians' decisions to perform cesareans. The Committee also heard presentations on this issue from Dr. Walter Hannah, representing the Working Group on Obstetrics and Gynaecology, and Dr. Manny Gluck from the CMPA.

Over the past 15 years, the frequency of malpractice claims filed against physicians in Canada has

tripled on a per capita basis. During this same period, the average size of awards paid by physicians has quadrupled in real terms. This growth in frequency and size of awards is comparable to that in the United States and the United Kingdom, although the average absolute frequency of claims in both countries is higher than in Canada (the United States is about five times higher). The Prichard report, *Liability and Compensation in Health Care*[141], states there is a "very substantial potential" for growth in the rate and frequency of claims being made against physicians and health care institutions. It estimated fewer than 10% of patients suffering health care injuries due to negligence actually receive compensation (250 did so in 1987) and there is reason to believe there will be growth in litigation against physicians unless reforms are undertaken.

Obstetrician-gynaecologists are assigned the highest risk category by the CMPA (Category 6) and accordingly pay the highest annual premium – $13,000 currently. Research compiled for the Prichard report found that anaesthetists, orthopaedic surgeons and obstetricians accounted for about 25% of claims paid although they are only 8% of Canada's physician population. Because of obstetricians' and anaesthetists' relatively high liability risk, Prichard commissioned surveys to assess the opinions of these specialists as well as family medicine/general practitioners, since they make up about 50% of the physician population and have traditionally provided obstetrical and anaesthetic services.

Findings from the three surveys are very pertinent to this discussion of non-medical influences on the rate of cesarean births in Ontario. For example, the survey of obstetricians revealed a significant increase over the last three years in the use of certain practices during the antenatal and intrapartum periods. The practices included in the survey were those for which effectiveness has not yet been established. These included early and late ultrasound, biochemical testing for fetal well-being, electronic fetal monitoring and cesarean section for suspected fetal distress. More than 50% of respondents said that in the last five years they had increased their use of electronic fetal monitoring with a corresponding increase in the use of cesarean section for *suspected* fetal distress (emphasis added). One-third of respondents said that their increased use of electronic fetal monitoring and cesarean section was strongly influenced by litigation concerns. These findings support the view that litigation fears are contributing to increased use of technology at an increased cost to the health care system.

In litigious societies, cesarean section is thought of as a litigation-proof procedure, evidence that the physician did everything possible to ensure the best outcomes for mother and baby[108]. A number of researchers have examined the relationship between fear of litigation and cesarean section. Carpenter et al[15], Goyert et al[62] and Newton and Higgins[120] did not find that fear of litigation influenced the decision. However, Marieskind[108], in her analysis of factors affecting cesarean section rates, and Lomas and Enkin[107], in their extensive literature review, identified malpractice litigation as an important influence on cesarean section rates. The survey of obstetricians conducted for the Prichard report found the majority of obstetricians in Canada would decide to perform cesareans in cases of suspected fetal distress because of litigation concerns. There was agreement among two-thirds of respondents that they were less likely to be sued in the event of a neurologically damaged baby if they had performed a cesarean section.

The Prichard report sets forth a basic strategy of reform that contains three principal elements:

i) maintaining and reforming actions for negligence against physicians and health care institutions (Recommendations 3-18, 42-44 and 72);
ii) increasing the responsibility of health care institutions for higher quality health care (Recommendations 29-40 and 67-68); and
iii) developing a no-fault compensation system for persons suffering significant avoidable health care injuries (Recommendations 45-64 and 75).

All three medical specialties surveyed said the CMPA newsletter was the most influential source of information about professional liability issues (88% of family physicians, 92% of anaesthetists and 90% of obstetricians). The second most common and influential source of liability information for all three specialties was informal discussion with peers. Only a very small percentage of respondents said that educational sources such as regulatory bodies, continuing medical education programs and post-graduate training programs were influences on their current practice style.

In a research paper prepared for the Prichard report, Bernard Dickens comments that the CMPA, through the legal guidance given to its members, reinforces unduly conservative patterns of practice including a reluctance to employ new, more effective, safe or economic medical means[35]. Given the influence of the CMPA, it is important that its 1989 newsletter on cesarean section be updated to reflect current research findings.

Nurses' Fear of Litigation

A research paper on nurses' involvement in litigation was also commissioned for the Prichard report[48]. The paper concluded that although the practice of including nurses as defendants has grown since 1970, there is little evidence of growth in their actual liability despite the anxiety expressed by key informants surveyed. A nurse's negligence has typically been regarded by the

courts as the responsibility of the employer.

Provincial and territorial nurses' associations provide secondary professional liability insurance to their members. The Canadian Nurses' Association estimated that over the last eight years, 10 jurisdictions contributed about $5 million in professional liability premiums while approximately $100,000 was paid out in claims.

Like obstetricians surveyed for the report, nurses felt fear of liability has resulted in increased documentation in the patient record[48]. Nurses surveyed did not necessarily relate increased documentation to improved standards of patient care, but rather to defensive nursing practice.

Human Resources

An association between the availability of anaesthetists, obstetricians and family physicians and the rate of cesarean sections has not been clearly established. Available data suggest, however, that Ontario is experiencing a decrease in the number of family physicians in rural areas who are willing to provide obstetrical services or obstetrical anaesthesia. A survey showed that 85% of rural respondents provided obstetrical services five years ago, while only 40% do so now[141]. Only 10% of Ontario family physicians indicated a willingness to administer general anaesthesia, while five years ago 21% provided this service.

A 1988 survey of 88 small Ontario hospitals (less than 100 acute care beds) was conducted by the Ontario Medical Association under the direction of Dr. James Rourke. He confirms the decrease in family physicians practising obstetrics in rural communities. Based on 80 responding hospitals, he reports that:

> 97% of all cesarean births and 88% of all deliveries were performed in the 46 hospitals that had cesarean section available all or most of the time; 10 of these hospitals indicated that their cesarean sections were done by obstetricians, 27 hospitals indicated they were done by general surgeons and 10 hospitals responded they were done by other.

Most of the small hospitals surveyed rely on family physicians to do deliveries; 34% reported a shortage of local family physicians practising obstetrics and 66% predicted a shortage in the next five years[146].

Another OMA survey on staffing for obstetrical services[18] found that the number of new family physicians willing to perform obstetrics in small community hospitals (fewer than 750 births annually) would exceed the number retiring. However, these new practitioners will not cover six hospitals who rely on three or fewer physicians. These hospitals would stop providing obstetric services in 1990, including anaesthesia and surgical support.

When the Prichard report survey asked family physicians, who had limited or eliminated their obstetric practice over the last five years, the reasons behind their decisions, the majority (61.5%) cited a desired change in lifestyle. Concern about liability ranked second and was mentioned most often by physicians in Ontario. Physicians in Ontario and Quebec were more likely to give too few cases as a reason for decreasing or excluding obstetrics from their practice.

The significant decrease in the number of family physicians performing obstetrics reduces patients' access to local services but there is little evidence to suggest the standard of remaining services is reduced. Indeed, lack of proficiency was cited as a common reason for reducing obstetric practice, and the fact that cesarean births are performed in facilities with back-up services might indicate that standards have improved.

The report's Working Group on Obstetrics and Gynaecology expressed alarm about the growing crisis in the supply of practitioners. The survey showed that 42% of obstetricians stopped doing deliveries by age 48. It also found 23% stopped/reduced their obstetrical practice less than ten years after certification and 38% did so after 1-20 years in practice.

Studies by the Canadian Medical Association suggest a shortage of approximately 200 obstetricians nationwide. This shortage may be worsened by a lack of new obstetricians as replacements. Residency programs in obstetrics and gynaecology are experiencing difficulty in filling available positions each year.

Like family physicians, the most frequent reason given by specialists certified in obstetrics and gynaecology for limitation or exclusion of obstetrics from their practice was a change in lifestyle. Concern regarding liability was the second most common response.

The Committee views the attrition rate of family physicians providing obstetric services in rural areas and the impending shortfall of obstetricians with concern.

Financial Incentives

The Committee explored the literature with respect to financial incentives and method of delivery.

A cesarean section is a surgical procedure that takes approximately one hour of a physician's time[59]. Labour and vaginal delivery is a natural process that may require substantially more time. As Lomas and Enkin[107] point out:

> The influence of direct financial incentives will be far less than the indirect financial incentive represented by the ability to control the time and duration of the obstetrician's involvement when a cesarean section is performed, in contrast to the absence of such control with a spontaneous labour and delivery (p. 1191).

In Ontario, the Ministry of Health reimburses physicians $238.30 for a vaginal delivery and $285.90 for cesarean section.

There is a small differential fee of $26.00 for a VBAC[114]. These fees do not include prenatal or postnatal care or additional complications associated with labour or delivery.

Some investigators have questioned whether financial incentives (or disincentives) have an impact on the rate of cesarean sections. The Prichard report surveys of obstetricians and family physicians found that, respectively, about 5% and 21% of respondents cited inadequate compensation as the most influential reason behind their decision to limit or eliminate their practice of obstetrics.

Some have suggested changing the reimbursement system, instituting a financial incentive rather than disincentive for vaginal delivery[59], including a significant additional fee for a VBAC.

In 1986, Alberta introduced incentive fees for labour after cesarean birth regardless of whether the outcome was vaginal delivery or cesarean section (personal communication, Alberta Ministry of Health). These fees are significantly higher than the fee for a booked repeat cesarean section. Data from the 1989 Alberta Health Insurance Plan indicate that 70% of women experiencing labour deliver vaginally. However, VBACs in Alberta still account for only 3% of all births (compared to an estimated 1% in Ontario). The rate of cesarean sections was 19% for Alberta in 1989.

Physician Convenience

Some studies have looked at the convenience factor with respect to cesarean sections. If cesareans were being performed for convenience, one would expect to see a greater proportion done on weekdays and during the daytime or early evening hours. Fraser et al[57] evaluated this hypothesis and found no data to support the physician convenience theory. The similar Evans et al[45] study found acute and semi-acute cesarean sections were performed without demonstrated biases as to time or day, although non-acute cesarean sections were performed less frequently at night (midnight – 8:00 a.m.). Lomas and Enkin[107] reviewed a number of studies on this and concluded physician convenience does influence the cesarean section rate to an undetermined extent. They expressed concern about the amount the repeat cesarean rate is influenced by the convenience of scheduled operations for the woman, her family and the physician.

In some obstetrical departments, physicians work as a group to provide a 24-hour on-call service. If each group member has a similar philosophy of care, physicians can comfortably leave women in labour in the hands of their co-workers. This arrangement may reduce cesarean section rates; however, this impression has not been validated by formal evaluations.

Women's Preferences

While physicians carry out the surgical procedure of cesarean birth, it is clear that at least for the situations involving a choice of VBAC or a repeat cesarean, women's preferences are an important influence on the resulting decision. The views of women about the safety and desirability of a cesarean section or labour and vaginal birth need to be better understood.

The extent to which a woman's demands for a specific childbirth method actually affect practice has not been evaluated[59, 107]. Johnson et al[91] conducted a survey of American obstetricians to determine their responses to hypothetical cases in which a labouring woman requests a cesarean section, even though the obstetrician has recommended labour and vaginal delivery. In the cases in which there were clearly no medical indications for cesarean section, 90% of respondents indicated they would have continued with labour. For a scenario in which a woman labouring after a previous cesarean opts for a repeat section when she is nine centimetres dilated, 45% of the physicians would have continued with labour.

These hypothetical situations do not provide any possibility for exploring why the women requested a cesarean section. Given the current situation in North America and the lack of widespread information about VBAC, women may well *expect* a repeat cesarean. If offered no information about VBAC, the "preference" for a repeat cesarean will not reflect informed decision making.

In a California study of 100 women with a previous cesarean who were medically eligible for labour and vaginal birth, two-thirds of the women chose to labour while the others chose to have a repeat cesarean section[153]. A similar study by Kirk[96] of 168 women also showed this 2/3 – 1/3 distribution.

Chart audits were carried out in a small number of Ontario hospitals as part of a funded research study on cesarean birth[43] to review indications for repeat cesarean sections. Chart entries indicated that patient preference accounted for up to 50% of the repeat procedure in some hospitals. However, often charts did not provide a reason for repeat cesarean, so the data are incomplete. Even when patient preference was noted, there was no way to determine women's reasons for their preferences nor the extent to which they were informed of choices.

In the Kirk[96] and Shepherd-McClain[153] studies, women's reasons for choosing VBAC (shorter recovery period, wanting the experience of natural birth) or repeat cesarean section (avoiding the pain of labour, knowing what to expect and convenience) were more "social" than "medical". An exception was the belief expressed by a significant percentage of those choosing repeat cesarean section that they were not likely to deliver vaginally[96]. Indeed, the most common reason cited for choosing a repeat

cesarean section was the low probability of vaginal delivery. This finding emphasizes the importance of educating and counselling women about the probability of delivering vaginally after cesarean section so that informed choice is possible.

The interaction between a woman and her caregiver is important in acquiring information and making a decision. In two studies[96, 118] even when women identified themselves to be the sole decision-maker, the vast majority (86% and 79%) felt that their physician had a lot of influence on their decision to labour. That this interaction is often less than satisfactory is conveyed in reports from childbirth support groups about the difficulty many informed women have in locating a physician who will discuss options and provide care for a VBAC. Many hospitals in Ontario either do not provide for VBAC or have very restrictive policies. Physicians report that sometimes women (or their partners) refuse to consider a VBAC.

The limited research information points out the difficulty of drawing conclusions about the extent to which women's preferences affect actual practice. First, it is important to learn about actual preferences and also the reasons for the preferred delivery method. Then the quality of the information used by women needs to be assessed and the manner in which information/advice is given. Next, the process by which women and physicians reach agreement (or do not) is an important consideration.

Individual Practice Style

Several studies have investigated the influence of physicians' practice styles on the rate of cesarean sections. Recent research has found that variation among individual and groups of physicians cannot be attributed entirely to pregnancy risk factors, patient preferences or their socioeconomic status, duration of a physician's practice, the physician's recent medico-legal experience, or an improved neonatal outcome[62, 32] This research found individual practice style to be an important determinant of differences in cesarean rates among obstetricians.

In summary, this chapter has reviewed information about several non-medical factors that are thought to influence cesarean birth rates. While it is not possible to quantify the amount of influence of specific non-medical factors on the rate of cesarean section, it is clear from the literature that these factors exert important and not easily changed influences on both physicians and consumers.

Strategies to Change the Rate of Cesarean Section

Chapter 7

The increase in cesarean section rates in Canada and the United States over the last 20 years has generated a number of proposals for achieving reductions. The Committee reviewed the growing literature on the effectiveness of strategies to bring about a change in practice. This chapter examines strategies used to change the practice of health professionals and expectations of consumers.

Strategies to change medical practice

The behaviours to be changed are complex, having to do with the decision to perform a cesarean section, not the skill involved in doing one. In addition to the non-medical or social factors discussed in the previous chapter, a practitioner's ability or desire to change may be affected by personal experience, local peer consensus about the practice, the influence of local opinion leaders, and the practitioner's comfort level with the proposed changes[64, 92].

A number of studies have investigated the dynamics of physician behaviour and how best to modify clinical practice. There appear to be five strategies that can be effective: education, peer review and feedback, administrative changes, participation, and rewards and penalties.

Education

It is clear from the literature that information alone, whether as research findings in journals or as clinical guidelines from regulatory or professional bodies, is rarely enough to accomplish appropriate changes in practice[106, 159, 59, 92].

One educational strategy that failed was the distribution of the Consensus Statement guidelines on cesarean birth. These guidelines were endorsed by the Society of Obstetricians and Gynaecologists of Canada and widely distributed. A study to determine their effect on clinical practice found that though most obstetricians knew of, agreed with and indicated their practice had changed because of the guidelines, knowledge of their content was poor, and actual cesarean rates had changed only slightly from the previous upward trend. The authors concluded that while guidelines may lead physicians to consider changing behaviour, other incentives or the removal of disincentives are needed to effect rapid change in actual practice[106].

The American counterpart to these guidelines was also ineffective in changing practice[59]. In his commentary, Gleicher suggests guidelines do not carry the weight needed to alter ingrained practice patterns. In addition, guidelines may not take into account the environment of community practice; i.e., time pressures and liability concerns[159].

The literature on educational programs is large; however, there are methodological limitations in most evaluations. In a review of 248 continuing medical education (CME) articles, only seven met rigorous criteria for methodological soundness, such as random assignment of controls and subjects. The authors concluded these seven provided convincing evidence that CME can improve physician behaviour[73]. However, Eisenberg[39] states methodological limitations preclude a strong conclusion that education alone

can change physician behaviour.

Educational interventions mentioned in the literature include mailings, training workshops, small group discussions, meetings, lectures, self study, computerized reminders, simulated patients, information about the cost of medical care services, provision of guidelines, and education regarding medical decision analysis[29, 39].

Eisenberg[39] summarizes his review with the following conclusion on the most effective education program:

> The perceived needs of clinicians must be understood and then met by the educational program. Physicians' attitudes must be considered and perhaps altered. The active involvement of professional leadership is critical, and personal contact with the educator seems to be most successful. If physicians understand the need for change, then education will be more likely to alter their practice style (p. 110).

Goldman[60] suggests the success of educational strategies in changing behaviour depends on the environment. If competing forces (patient demands, financial incentives) push in the same direction as new information, a rapid change in behaviour may result. When this is not the case, other methods (feedback, administrative changes) may be more successful.

Peer Review and Feedback

Feedback is another method of changing physician behaviour, and some authors include it as a type of education. However, education has only a cognitive influence; the effect of feedback is both cognitive and behavioural[39].

Feedback is designed to change practice patterns by informing physicians about their own behaviour. Medical audit and review is one type of feedback with which physicians have experience. This process can be conducted externally or internally by peers. According to Wilbur[171], an impartial expert in the specialty is the best determinant of the standards of a physician's practice. He suggests peer review occur on a regular basis in accordance with standards understood by medical staff and reviewers, and that poor quality practices be acted upon promptly.

The most successful feedback, according to Eisenberg's[39] review, occurs

> if doctors are compared with their peers, and if information is delivered personally by a physician in a position of clinical leadership. It is most likely to be successful when it addresses a single clinical problem about which physicians have reached consensus regarding standards of practice (p. 117).

Because it preserves physician autonomy, internal peer review has been found to be an easier strategy to implement than more interventionist approaches such as external audit or penalties[159]. One form of external audit, albeit limited, may be hospital accreditation. In response to the high rate of cesarean sections, the U.S. Joint Commission on accreditation of health care organizations has set out indicators of obstetrical practices to be used in future quality assurance programs[159].

The involvement of clinical leadership is important in both educational and feedback strategies. The charisma or social and/or professional influence of a respected clinician may be the key to success or failure in changing practice patterns[39].

These two strategies fit the professional model of medical decision-making well. They assume that upon being informed of the difference between their own practices and an ideal or norm, physicians are well motivated to change their behaviour to provide value for money in medical care[39]. This is not always the case. Physicians are often resistant to change, and strategies must be developed to address this. Participation, administrative changes and rewards or penalties are three such strategies.

The basis of participation is that professionals should be involved when a change in their behaviour is desired. The strategy for change should be designed in the way that is most comfortable for the professional. The value of physician involvement in efforts to change their practices is an important lesson for quality assurance, since they must have a vested interest to respond optimally and contribute to a program's success[39].

Enforcing new administrative rules is another way to change behaviour. For example, a hospital could implement a mandatory second opinion for all repeat cesarean sections, objective criteria for performing primary or repeat sections, or a policy of active management of labour[165, 148, 119]. This strategy has its risks. It may be unpopular with physicians, and this may lead to an unpleasant work environment. Physicians may also develop processes to circumvent the rules[39].

Reliance on reimbursement as a strategy to decrease cesarean sections assumes the decision is based, at least in part, on financial incentives[159]. To date, incentive fees do not appear to increase VBAC rates. The incentive fee introduced in Alberta in 1986 to promote VBAC has had little impact. Similarly, American reviews of the impact of equalized physicians' fees for vaginal and cesarean deliveries have not shown a reduction in the rate of cesarean section[159].

The literature reports more experience with the use of penalties as a means of changing behaviour. An example would be decreased reimbursement for an elective cesarean section. Experience suggests that merely the threat of penalties is effective in changing physician practice patterns. Many of the successful programs using penalties also used other strategies[39].

Nursing Practice

Labour nurses play a key role in the care of women in hospital. A body of research demonstrates

that nursing care practices can reduce intervention rates during labour and birth. Upright positions and ambulation, for example, have been shown to decrease the length of first stage labour. Similarly, nurses who coach women to use exhalatory bearing-down rather than long sustained effort can decrease the likelihood of fetal hypoxia[17].

Supportive care during labour has beneficial effects even when the women studied are most likely to have favourable outcomes. In one Toronto study, an experimental group with one person providing continuous professional support was less likely to use pharmacologic pain relief or have episiotomies and more likely to have a greater sense of personal control[79, 78]. A second Toronto study also demonstrated that women under care of family physicians who also had continuous support from an independently employed midwife were less likely to have an episiotomy, epidural and a continuous fetal monitor than those attended by family physicians alone[144].

No Canadian studies were found to show a systematic influence of continuous support on cesarean birth. A beneficial effect was seen in Guatemalan studies[158, 97] and is reported to be a key factor in the low rates reported by the National Maternity Hospital in Dublin[128]. Several anecdotal reports support a positive relationship between one-to-one supportive care and a vaginal birth following previous cesarean.

However, observational studies of nursing practice in the Toronto area demonstrate the focus of care has shifted to more technical aspects of childbirth[13, 75, 76, 77, 87]. Women reported being cared for by three to 14 nurses (average 6.4) through a labour and birth. Such care generally consisted of intermittent visits for the primary purpose of monitoring the physical status of mother and fetus[75, 74].

These studies of nursing care point to a need for nurses to be more aware of the most current information about maternity practices and policies. The survey of Ontario hospitals (1989/90) showed that the majority of nurses in maternal and newborn units do not have specialized preparation in maternity care. Post-diploma courses – either full- or part-time – were available in 1989 in five community colleges and one university (one in East, two in Central East, three in Central West). New programs are being developed, but opportunities for study are limited by travel distance and difficulty arranging schedules. Distance-learning opportunities are needed, especially for nurses located in more remote areas and in regions not served by existing programs.

Continuing education programs need to be evaluated for effects on patient care. Education programs for nurses that combine new information, feedback on practice, and new clinical care policies might produce the greatest impact, but this too requires assessment.

Consumer Information

Objective information about the frequency of cesarean birth, the risks and benefits of VBAC and other aspects of care during labour are necessary if women are to be informed participants in decisions about their care. The research in this topic is limited[96, 118, 153], but findings do support the importance of information. Facts about risks and benefits, mortality and morbidity may be useful but limited unless they are able to be interpreted in a context of personal beliefs and experience. Previous difficult labour or a cesarean and personal ideology about reproduction can influence the way in which facts are understood or used.

Caregiver support was shown to be important in the Kirk[96] and Shepherd-McClain[153] studies. Good rapport and communication were critical to ensuring that women were objectively and fully informed about VBAC. Duff et al[38] state that "with appropriate counselling by physicians who are positive toward VBAC, virtually all patients will consent to trial of labour."

This need for good communication is a source of concern when contrasted with a conclusion from the Prichard report[141]. They found that although physicians felt physician-patient communication was extremely important, particularly as it relates to informed consent, physicians were uncertain about how to establish and maintain rapport. Surveys from three specialty groups (family physicians, obstetricians, and anaesthetists) indicated that although physicians had increased written documentation and time spent communicating with patients about treatment risks and benefits, the most common reason given for this was fear of litigation, not a desire to improve standards of care. As well, most physicians surveyed (60% of family physicians, 79% of anaesthetists, 78% of obstetricians) felt patients were usually not able to understand the risks and benefits of medical care.

Childbirth preparation groups are also sources of information about maternity care, including VBAC. The number and variety of prenatal classes vary across the province, with some communities having special classes available for cesarean birth or VBAC.

Traditionally, Boards of Health have provided childbirth preparation classes, but these programs may be reduced since they are not included in the Mandatory Health Programs and Services Guidelines[113].

Public dissemination of information about cesarean birth is another strategy to inform women and families and alter existing cesarean rates. A report of interest[36] from an area of Switzerland showed the effect of conducting a mass media campaign about rates and indications for hysterectomy. Beginning two months after the start of the campaign and during the following year the hysterectomy rate decreased by more

than a quarter.

Public dissemination of hospital cesarean section rates has been promoted by both professionals[59, 173] and consumers as a strategy to reduce cesarean sections[159]. In 1989, a consumer advocacy group in the United States published hospital-specific cesarean section rates for 30 states, giving particular attention to those hospitals with rates above 35%. As well, the Public Citizen Health Research Group has lobbied strongly for legislation that would require public reporting of cesarean section and birthing practices. Lobbying efforts of consumer groups have led to laws requiring hospitals and birth centres to give each woman booked to give birth at their institutions an informational pamphlet that includes cesarean rates. There are also public education materials on birthing options produced by groups such as the International Childbirth Education Association, SOGC and VBAC Association of Ontario. These materials may not be widely distributed, however, and women may remain unaware of issues concerning cesarean birth.

Consumer groups and professional societies receive little or no government funding for the development and distribution of educational materials. A mass media campaign requires that materials be produced for a varied audience and be widely available. A coordinated strategy that offers general information to a wide audience, then opportunities to obtain more detailed information from appropriate people or organizations, seems advisable.

Hospital Programs

A number of hospital-specific programs designed to reduce cesarean section rates have been reported. Porreco[138] details a five-year educational program directed at physicians, nurses and interested lay groups. The intervention consisted of a number of presentations (maximum 30) to each group over the study period. The program did not appear to be successful, as the cesarean section rate in the community actually increased over the five years. The lowest rates were achieved at teaching hospitals with full-time residents on staff and at a large Health Maintenance Organization with 24-hour, on-call physicians.

Myers and Gleicher[119] described a teaching hospital program that included a second opinion requirement, objective criteria for specific indications, and peer review. The program was instrumental in decreasing the hospital's cesarean section rate from 17.5% to 11.5% during its first two years of operation.

In 1987, the University Medical Centre of Jacksonville, Florida, began a department-wide quality assurance program to reduce its rate of cesarean sections. The 1986 rate of 28% in this large teaching hospital (approximately 4,500 annual deliveries) declined to 11% in 1989 and 8.6% during the first six months of 1990. The decrease was accomplished without compromise to neonatal outcomes.

The VBAC components of this program included the introduction of new guidelines for intrapartum care of women with previous cesarean sections, counselling of women with previous cesarean section on the benefits of VBAC, and discontinuing the routine offer of a repeat section to women who were eligible for a vaginal birth. Repeat cesarean sections decreased from 8.0% in 1986 to 3.3% in 1989. The proportion of women who were supported through labour after a previous section increased from 32% to 84% during the same period, with 83% of these women delivering vaginally[148].

The rate of primary cesarean sections in University Medical Centre declined from 19.5% to 7.2% as a result of new guidelines on the diagnosis and management of dystocia, fetal distress and breech births. The program also included weekly review of each cesarean section by departmental residents and faculty physicians.

The Ontario researchers who studied the effect of the Canadian Consensus Statement are currently investigating the effect of two randomly allocated strategies to decrease the rate of repeat elective cesarean sections. The first strategy is identification of a person – an "educational influential" – in a hospital who attends a workshop presenting evidence supporting the cesarean section guidelines and returns to the hospital to effect change. The second strategy is medical audit and feedback at the departmental level. The results show a greater and more sustained change for hospitals using the educational influential strategy.[68]

A pilot VBAC Awareness Program was introduced in Alberta's Foothills Hospital and a funding proposal has been submitted to the Alberta Ministry of Health for similar programs in the larger specialty hospitals in Edmonton and Calgary. The awareness program, developed by the Southern Alberta Perinatal Education Program, involves the development of a physician booklet, case recall physician interviews following VBAC or repeat section, patient interviews, audit and feedback of results to physicians and the development of a patient education program[2].

The literature seems to suggest that the most successful hospital-based programs occur in large teaching hospitals and incorporate several strategies to change behaviour. Teaching hospitals have residents on call, and a more centralized decision-making structure, which may influence the success of a quality assurance program to reduce cesarean section rates.

While this suggests community hospitals may find it more difficult to achieve reductions, the literature may only reflect that more studies have been carried out in teaching hospitals. The Ontario study of the impact of the Consensus Statement was conducted in community hospitals, and all participants were able to implement programs intended to reduce cesarean births.

Recommendations

Chapter 8

This chapter presents the Committee's recommendations for activities to improve clinical practice and achieve the objectives of reducing cesarean births and increasing normal spontaneous births. The recommendations are comprehensive and pertain to the several influences on cesarean births presented in earlier chapters.

Updating practice guidelines

To the Society of Obstetricians and Gynaecologists:
The Committee recommends that the practice guidelines concerning cesarean section published in 1986[25] be updated.

The guidelines resulted from the National Consensus Conference on Aspects of Cesarean Birth held in October 1985. The Society of Obstetricians and Gynaecologists of Canada fully endorsed the final statement. As it is the national organization of obstetric specialists, the SOGC should consider new information and modify the statement to reflect the best available information about effective care. The Committee recommends the following revisions:

1 Designation of appropriate hospital facilities
The Committee recommends that the description of facilities be amended to state that all obstetrical services that now have the capacity to carry out emergency cesarean sections can safely care for women labouring after a previous cesarean without any increase in resources.

2 Labour after more than one previous low transverse cesarean section
The review of the information about labour after more than one previous section appears to be encouraging. In view of the growing positive experience, the Committee recommends that management decision about labour and vaginal birth after more than one previous cesarean section be between a woman and her care provider.

3 Consultation/Notification
The Committee recommends that the guidelines be revised to no longer require primary care providers to obtain a specialist consultation when there is documentation of a lower segment transverse cesarean section in a woman with no identifiable risk. The primary care provider must ensure that available resources for intrapartum care are in place, as is required for any woman in labour.

4 External cephalic version for breech presentations
The Committee recommends that the guidelines direct practitioners to consider the use of external cephalic version at term in view of its demonstrated effectiveness in converting infants to a cephalic presentation and thereby reducing the risk of a cesarean birth.

Responsibility for Continued Updating of Guidelines

To the Society of Obstetricians and Gynaecologists:
The Committee recommends that SOGC consider what resources are needed for regular updating of guidelines and collaborate with appropriate government ministries and/or regulatory bodies to keep guidelines current and valid.

The Cesarean Birth Committee reviewed recent literature in order to recommend areas of the Consensus Statement in need of updating. This raises the question about where responsibility resides for keeping practice guidelines up to date. Specialist organizations are a logical resource for such activities, but few have the staff or in-house expertise to carry out a critical evaluation.

Adoption of a New Standard of Care

The Committee recommends that labour after a previous cesarean section be the standard of care for women with no identifiable risk.

To further this broad recommendation, the Committee devised a series of specific recommendations directed to professional groups and individual practitioners.

To the Ontario Medical Association:

1 The Committee recommends that the Ontario Antenatal Record (see Appendix VIII) be revised to categorize otherwise healthy women with a documented lower segment transverse cesarean section as "at no identifiable risk" (Grade A on the Record). The Committee urges this change so that a distinction is made between a lower segment transverse incision and other types of uterine surgery in the consideration of risk status.

The Committee also recommends that the descriptive terms no identifiable risk, moderate risk and high risk replace the current Grade A, Grade B and Grade C labels for categories of risk status. These labels have a connotation that judgements about merit or performance are being made.

The Committee recommends that labour and vaginal birth after cesarean section be added to the list of discussion topics on page 1 of the Antenatal Record.

To the Ontario Hospital Association, the Ontario Medical Association, the Ontario Nurses' Association and the Registered Nurses' Association of Ontario:

2 The Committee recommends that these groups jointly issue to all hospitals with maternity services a model protocol for the care of women with no identifiable risk who labour after a previous lower segment cesarean section. The protocol should also be made available to any future licensed out-of-hospital birth facilities.

The following elements of care are to be included in the protocol:

- companion(s) of choice;
- hospital admission in active labour;
- ambulation;
- oral hydration;
- group and screen for blood with usual availability of blood products;
- usual nurse-patient ratio (the desired ratio is one-to-one for all women in active labour);
- oxytocin protocol as per SOGC guides (refer to Appendix IX).

The following are *not* mandatory for the care of women in labour who have a previous lower segment cesarean section.

- continuous electronic monitoring;
- Foley catheter in situ;
- routine cross-matching of blood;
- routine examination of the uterine scar following delivery;
- anaesthetist, obstetrician, surgeon and paediatrician (neonatologist) on site throughout labour or the continuous presence of the primary caregiver throughout labour;
- intravenous line established.

To all professional organizations, the Ministry of Health and childbirth education groups:

3 The Committee recommends that the language used in discussion and in written materials to describe aspects of cesarean birth be changed to reflect positive attitudes. Some of the terms used carry negative connotations and convey a value judgment about the woman involved. Examples and recommendations include:

- "trial of labour" be changed to simply "labour";
- "failure to progress" be changed to "non-progressive labour";
- "successful (or failed) vaginal birth after cesarean section" be dropped. The birth is vaginal or cesarean and no value judgement need be implied;
- "candidate" for vaginal birth after cesarean be changed to "women planning."

Prevention and Treatment of Dystocia

To the Maternal and Newborn (or equivalent) Committee of each hospital:

The Committee recommends that changes be made to the care of women with no identifiable risk in labour to decrease the occurrence of dystocia and the consequent frequency of cesarean section.

1 **Labour care policies**

The Committee recommends the adoption of policies consistent with the best available evidence about factors that influence the progress of labour and cesarean birth rates (see Chapters 3 and 4). Policies should provide for:

- admission to the labour and delivery unit only when active labour is established;
- regular periodic auscultation[1] of the fetal heart rate rather than the use of continuous electronic monitoring;
- the presence of supportive companions of the woman's choice for labour and birth;
- one caregiver to one actively labouring woman. Supportive companions do not replace the need for a skilled caregiver during labour.

2 **Induction of Labour**

Because induction of labour is found in frequent association with dystocia, the Committee recommends:

[1]The American College of Obstetricians and Gynaecologists states in its November 1988 newsletter that for low-risk patients in labour, there are no data to demonstrate optimal time intervals. The standard practice is to evaluate and record the fetal heart rate at least every 30 minutes following a contraction in the active phase of the first stage of labour, and at least every 15 minutes in the second stage of labour.

a) that induction of labour be undertaken only when there is a clear medical indication;
b) that pre-labour rupture of membranes at term without evidence of infection be managed expectantly. Early induction appears to lead to more frequent cesarean sections and infectious morbidity[96];
c) that a favourable Bishop Score be a prerequisite to commencing an induction;
d) that in the absence of a favourable score, where there is a clear medical indication for induction, cervical preparation be undertaken with a vaginal or intracervical prostaglandin product (see Appendix X).

3 **Augmentation of Labour**
The Committee recommends that when a diagnosis of dystocia is made, amniotomy be performed (when membranes are intact) as part of the overall assessment of maternal fetal status, and that in the absence of obstetrical contraindications, labour be augmented with oxytocin. The SOGC protocol for oxytocin administration is recommended (see Appendix IX). In most instances cesarean section is not the initial treatment of choice.

To the OMA Reproductive Care Committee and the OMA Section on Obstetrics and Gynaecology:

1 ***Use of a Partogram***
Because of evidence that dystocia (and therefore cesarean section) is frequently diagnosed in the latent phase of labour, the Committee recommends the development of an Ontario Intrapartum Record that contains a partogram to standardize the diagnosis of dystocia. Examples are contained in Appendix XI. Fraser[56] suggested that the partogram devised by Philpott[136] has advantages for clinical decision-making. The graph displays alert and action lines to assist health professionals in the detection and diagnosis of non-progressive labour.

Modification of Non-Medical Factors to Encourage Adoption of Practice Guidelines

Fear of Litigation

To the Canadian Medical Protective Association:
The Committee supports the major reforms to liability insurance recommended in the Prichard report. In particular, implementation of a no-fault compensation plan could substantially reduce obstetrical practitioners' fears about litigation in the event of an adverse birth outcome.

The Committee recognizes the influence of the Canadian Medical Protective Association on physicians' actions and perceptions about the safety of certain activities. The Committee therefore recommends revision of the 1989 statement concerning labour after a previous cesarean section. Physicians should be encouraged and find support for VBAC as the standard of practice. The statement should be updated to be consistent with revisions to practice guidelines made by SOGC.

Human Resource Planning

To the Ministry of Health:

1 The Committee supports initiatives to improve the care of women during labour and birth:
- nursing standards and staffing arrangements that provide one-to-one care;
- introduction of midwives as primary care providers for women without identifiable risk;
- increased obstetrical opportunities for family medicine residents.

2 The Committee recommends a provincial study of maternal and newborn resources that includes estimates of the numbers of professionals needed for primary and consultant services, their present availability, and strategies to meet the need. The staffing of small hospitals is of special importance to such a study.

Remuneration for Physicians

To the OMA Tariff Committee and the Ministry of Health:
The Committee recommends that alterations be made to the fee schedule that encourage practices consistent with professional guidelines.

The Committee recognizes the schedule disruption and time commitment required of physicians who care for women in labour after a previous cesarean, in comparison to conducting elective repeat cesareans. The following specific recommendations are intended to remove any financial gain from conducting elective repeat cesareans.
a) place a premium on labour and vaginal birth after a previous cesarean in comparison to the fee for a cesarean section;
b) equalize the fee for a elective repeat cesarean section and a spontaneous vaginal birth;
c) increase the fee for an emergency cesarean birth in comparison to a scheduled repeat cesarean;
d) allow a fee for induction or augmentation of labour even when the outcome is a cesarean section.

Information Needs of the Public and Professionals

1 **Public Education**
Women and their families must be provided with up-to-date information about cesarean birth and the strategies to reduce its prevalence. Partnerships between women's/childbirth interest groups and health care providers and institutions are essential for a well-informed public.

To the Ontario Hospital Association and all hospitals:
a) The Committee recommends that hospitals include consumers on maternal and newborn (or equivalent) committees that review and plan for childbirth services.

To the Ministry of Health:
b) The Committee recognizes the importance of prenatal education programs in providing information to the public, and recommends that prenatal courses include up-to-date information on cesarean section and VBAC. The Committee was especially concerned about

possible reductions in prenatal education programs offered by health units because, as of January 1991, they no longer come under the Mandatory Health Programs and Service Guidelines[113]

The Committee recommends that:

- Health units be fully funded for the provision of prenatal education.
- Programs be provided by public health nurses in collaboration with hospital staff members, community midwives, and other childbirth educators in the community. In this way, childbirth preparation is integrated with other programs in pre-conceptional care and parenting.
- Programs give special consideration to the creation of classes for women with previous cesarean birth(s).

c) In the interest of having high standards for prenatal programs the Committee recommends a group be convened, with representatives of hospital perinatal services, health units, consumer groups and relevant professional associations, to develop standards and curriculum for prenatal programs.

Further, the Committee recommends that this planning group investigate the production of easily understood, multilanguage written and audiovisual materials on aspects of labour and birth, including cesarean section and VBAC, for use by hospitals, consumer groups, public libraries, the media and school programs in family life education.

To Regional Health Units:

d) The Committee recommends that postpartum cesarean birth mothers be visited either in hospital or at home by public health nurses who can provide information about VBAC for subsequent births.

2 **Professional Education**

Specific additions are needed to educational programs that concern maternity care and cesarean birth.

To educational programs that prepare providers of maternity care.

The Committee recommends the following:

a) Basic curricula for physicians, nurses and (in the future) midwives
   - emphasize the normal aspects of labour and birth;
   - ensure teaching presents labour and vaginal birth after a previous cesarean as the standard of care;
   - include an understanding of the use of labour partograms;
   - include the development of interpersonal communication as a skill of fundamental importance.

b) Family physicians, midwives and obstetricians receive instruction in the performance of external cephalic version;

c) Obstetrical residency programs increase opportunities for developing competence with vaginal breech births;

d) Continuing education programs specific to labour and birth for nurses. These programs must include content on supportive care in labour, including verbal, non-verbal, touch and relaxation modalities. Nurses should receive support from hospitals to obtain specialty preparation and certification in intrapartum care (such as that offered by the Nurses' Association of the American College of Obstetrics and Gynaecology/NAACOG).

The Committee recommends special emphasis on developing distance learning opportunities in Northern areas.

Hospital Audit and Feedback to Practitioners

To the Ministry of Health, Ontario Hospital Association and all hospitals:

The Committee recommends that an audit and feedback process be established in each hospital. In order to accomplish this:

1 Each hospital with maternity services is to have a Maternal and Newborn (or equivalent) Committee. The Committee should include representatives of nursing, medical and other care providers relevant to the setting and include consumer/public representatives. The Committee should be accountable for maternity policies and quality of care to the hospital board through the medical/professional advisory committee.

2 Each Maternal and Newborn Committee is to conduct an audit of births that provides the hospital board with the:

- overall rate of cesarean, instrumental and spontaneous births;
- reasons for primary cesarean births;
- rate of elective repeat cesarean births;
- rate of vaginal births following previous cesarean sections,

and provides to the Chief of Obstetrics and individual practitioners the rate of cesarean birth for that individual.

3 The Ministry of Health is to distribute to hospitals a standardized audit tool.

Appendix XII contains a sample audit tool that can be used with or without computer facilities. Use of the tool provides a Maternal and Newborn Committee with information about the indications for cesarean section and outcomes for mothers and newborns.

These data enable the Maternal and Newborn Committee to recommend policy and practice changes within the maternity unit. The Chief of Obstetrics can identify individual physicians who do not meet practice guidelines and provide them with direct performance feedback.

1 Hospitals are to make information about cesarean birth rates (and other maternity care practices) available to regional/community professional and consumer groups. Regular publication (e.g., every three years) of this information is recommended.

To the Canadian Hospital Association:

5 The Committee recommends that accreditation criteria

for hospitals include a requirement for a Maternal and Newborn Committee and regular audits of maternity practices.

Monitoring Audit Results

The Committee gave careful consideration to a plan for reporting cesarean section audit results, but realized there is no permanently established organization with expertise in perinatal care than can review audit results on a continuing basis. However, the Provincial Maternal and Newborn Advisory Committee, chaired by the Ministry of Health's Maternal and Newborn Co-ordinator, is a currently existing group with broad expertise that can provide a level of support for audit activities. The Advisory Committee is knowledgeable about provincial resources and is in an excellent position to help provide assistance to a local hospital if needed.

To the Provincial Maternal and Newborn Advisory Committee:

1 The Committee recommends

- monitoring of annual HMRI data on cesarean birth rates in Ontario hospitals;
- requesting from selected hospitals their most recent audit results and their goals and plan for achieving an appropriate cesarean rate;
- consultation to those hospitals if needed;
- monitoring results of hospitals' plans to reduce cesarean rates.

To the Ministry of Health and professional regulatory colleges:

2 On a long-term basis, the Committee recommends consideration of the organizational structures best suited to the monitoring of data and the development of programs to improve care on a long-term basis.

To the Ministry of Health:

3 The Committee recommends consideration of the best methods of obtaining data about cesarean birth (and other perinatal practices), including a computerized database. Individual audit packages for a series of care practices will be too time-consuming and cumbersome. An on-line computerized perinatal data base could provide information on a spectrum of practices and be reviewed at regular intervals for local, regional or provincial needs. A feasibility study in one region may be a useful beginning step.

Provincial Conference on Cesarean Birth

To the Ministry of Health:

The Committee recommends funding a conference focused on strategies used in various types of institutions that have succeeded in reducing cesarean births. Invited experts from North America would present the process and outcomes of cesarean reduction programs.

Each hospital would be asked to designate a minimum three-member team (including a consumer member) to have ongoing responsibility for audit activities, education rounds, etc., in their setting. The team will be invited to the conference with fees waived. Workshop sessions would focus on how-to approaches and on making sure the teams are well informed about cesarean birth issues.

Research

To the Ministry of Health:

The Committee recommends that:

a) the Health Research and Development Program gives high relevance to proposals concerning cesarean birth for the next two years.

b) the Health Promotion Branch defines cesarean prevention as a health promotion strategy and encourages proposals that include community participation and public education.

References

References

1. Akoury, Hani A., Brodie, Glen, Caddick, Robert, McLaughlin, Victor D. and Pugh, Paul A. Active management of labor and operative delivery in nulliparous women. *American Journal of Obstetrics and Gynecology.* (1988), 158(2): 255-258.
2. Alberta Ministry of Health. Personal communication, July 1990.
3. American College of Obstetricians and Gynaecologists. Guidelines for vaginal delivery after cesarean birth. *American College of Obstetricians and Gynaecologists Committee Opinion.* (1988), 64.
4. American College of Obstetricians and Gynaecologists. *Newsletter.* (1988), 32(11): 4-5.
5. Anderson, G. and Lomas, J. Determinants of the increasing cesarean birth rate: Ontario data 1979-1982. *New England Journal of Medicine.* (1984), 311(14): 887-892.
6. Anderson, G.M. and Lomas, J. Explaining variations in cesarean section rates: patients, facilities or policies? *Canadian Medical Association Journal.* (1985), 132: 253-259.
7. Anderson, G.M. and Lomas, J. Recent trends in cesarean section rates in Ontario. *Canadian Medical Association Journal.* (1989), 141: 1049-1053.
8. Arulkumaran, S., Ingemarsson, I. and Ratnam, S. Oxytocin augmentation in dysfunctional labour after previous caesarean section. *British Journal of Obstetrics and Gynaecology.* (1989), 96: 939-941.
9. Benedetti, T.J., Platt, L. and Druzin, M. Vaginal delivery after previous cesarean section for a nonrecurrent cause. *American Journal of Obstetrics and Gynecology.* (1982), 142(3): 358-359.
10. Berkowitz, G., Flarman, G., Mojica, M., Bauman, J. and Haynes de Regt, R. Effect of physician characteristics on the cesarean birth rate. *American Journal of Obstetrics and Gynecology.* (1989), 161: 146-149.
11. Berwick, Donald M. Sounding Board – Continuous improvement as an ideal in health care. *New England Journal of Medicine.* (1989), 320(1): 53-56.
12. Brady, K. and Read, J.A. Vaginal delivery of twins after previous cesarean section. *New England Journal of Medicine.* (1988), 319(2): 118-119.
13. Butani, P. and Hodnett, E. Mothers' perceptions of their labor experiences. *Maternal Child Nursing Journal.* (1980), 9(2): 73-82.
14. Canadian Medical Protective Association. Obstetrics: vaginal birth after cesarean section (VBAC). *Information Letter.* (1989), 4(2): 1-2.
15. Carpenter, M., Soule, D., Yates, W. and Meeker, C. Practice environment is associated with obstetric decision making regarding abnormal labor. *Obstetrics and Gynecology.* (1987), 70: 657-662.
16. Cesarean Birth Association of Montreal. *Cesarean Birth: presenting the options to parents. A manual for health care workers.* 1-23.
17. Chalmers, I., Enkin, M. and Keirse, M. Effective care in pregnancy and childbirth: summary and conclusions. *Effective Care in Pregnancy and Childbirth.* (1989), Chalmers, Enkin, and Keirse (Eds.). Vol. 2. Oxford University Press: Oxford.
18. Chance, G.W. and Campbell, M.K. Staffing for obstetrics in small Ontario hospitals: implications for paediatricians. Presented at the Annual Meeting, Royal College of Physicians and Surgeons. Toronto, Sept. 14-17, 1990.
19. Chattopadhyay, K., Sengupta, B.S., Edress, Y.B. and Lambourne, A. Vaginal birth after cesarean section: management debate. *International Journal of Gynecology and Obstetrics.* (1988), 26: 189-196.
20. Chazotte, C., Madden, R. and Cohen, W.R. Labor patterns in women with previous cesareans. *Obstetrics and Gynecology.* (1990), 75(3:1): 350-355.
21. Chazotte, C. and Cohen, W.R. Catastrophic complications of previous cesarean section. *American Journal of Obstetrics and Gynecology.* (1990), 163(3): 738-742.
22. Chervenak, F. and McCullough, L. Clinical guides to preventing ethical conflicts between pregnant women and their physicians. *American Journal of Obstetrics and Gynecology.* (1990), 162(2): 303-307.
23. Clemenhagen, C., Champagne, F., Constandriopolous, A. and Pineault, R. Hospital-based quality assurance: a starting point for physicians and managers. *Canadian Hospital Association, Ottawa.* (1987).
24. College of Physicians and Surgeons of Ontario. The issue is: quality assurance. *Members Dialogue.* (1990), 3: 2-4.
25. Consensus Conference Report. Indications for cesarean section: final statement of the panel of the national consensus conference on aspects of cesarean birth. *Canadian Medical Association Journal.* (1986), 134: 1348-1352.
26. Cragin, E. Conservatism in Obstetrics. *New York State Journal of Medicine.* (1916), 104:1.
27. CSIP. Cesarean section consensus statement implementation project. McMaster University, Hamilton, Ontario. (1987).
28. Davey, M.R., Moodley, J. and Hofmeyr, G.J. Labour after caesarean section – the problem of scar dehiscence. *South Africa Medical Journal.* (1987), 71: 766-768.
29. Davis, D. (McMaster University). Presentation to the Cesarean Birth Committee on Continuing Medical Education. (June 5, 1990).
30. De Jong, P. Trial of labor following cesarean section – a study of 212 patients. *International Journal of Gynecology and Obstetrics.* (1987), 25: 405-411.
31. De Muylder, X. Vaginal delivery after caesarean section: is it safe in a developing country? *Australian New Zealand Journal of Obstetrics and Gynaecology.* (1988), 28: 99-102.
32. DeMott, R. and Sandmire, H. The Green Bay cesarean section study. The physician factor as a determinant of cesarean section rates. *American Journal of Obstetrics and Gynecology.* (1990), 162: 1593-1602.
33. Dewhurst, C.J. The ruptured cesarean section scar. *Journal of Obstetrics and Gynecology of the British Empire.* (1957), 113-118.
34. Dhall, K., Mittal, S.C., Grover, V. and Dhall, G.I. Childbirth following primary cesarean section – evaluation of a scoring system. *International Journal of Gynecology and Obstetrics.* (1987), 25: 199-205.
35. Dickens, B. *Liability and Compensation in Health Care.* A report to the conference of Deputy Ministers of Health of the Federal/Provincial/Territorial review on liability and compensation issues in health care. Volume 2. The effects of liability on health care providers. (1990).
36. Domenighetti, G., Luraschi, P., Casabianca, A., Gutzwiller, F., Spinelli, A., Pedrinis, E. and Repetto, F. Effect of information campaign by the mass media on hysterectomy rates. *The Lancet.* (Dec/1988), 1470-1473.
37. Donabedian, A. The quality of care: how can it be assessed? *Journal of the American Medical Association.* (1988), 260(12): 1743-1748.
38. Duff, P., Southmayd, K. and Read, J.A. Outcome of trial of labor in patients with a single previous low transverse cesarean section for dystocia. *Obstetrics and Gynecology.* (1988), 71(3:1): 380-384.
39. Eisenberg, J. *Doctors' Decisions and the Cost of Medical Care.* Health Administration Press, Ann Arbor. (1986), 99-142.

40. Enkin, M., Keirse, M. and Chalmers, I. *A Guide to Effective Care in Pregnancy and Childbirth.* (1989), Oxford University Press: Oxford.
41. Enkin, M. Labour and delivery following previous caesarean section. *Effective Care in Pregnancy and Childbirth.* (1989), Oxford University Press: 1196-1212.
42. Enkin, M. Review of studies on external cephalic version – personal communication to the committee. (1990).
43. Enkin, M., Gauld, M. and Hannah, W. Presentation to the cesarean birth committee on consensus statement implementation project. (March 28, 1990).
44. Eriksen, N. and Buttino, L. Vaginal birth after cesarean: a comparison of maternal and neonatal morbidity to elective repeat cesarean section. *American Journal of Perinatology.* (1989), 6(4): 375-379.
45. Evans, M., Richardson, D., Sholl, J. and Johnson, B. Cesarean section: assessment of the convenience factor. *Journal of Reproductive Medicine.* (1984), 29(9): 670-676.
46. Farmakides, G., Duvivier, R., Schulman, H., Schneider, E. and Biordi, J. Vaginal birth after two or more previous cesarean sections. *American Journal of Obstetrics and Gynecology.* (1987), 156(3): 565-566.
47. Finley, B. and Gibbs, C.E. Emergency cesarean delivery in patients undergoing a trial of labor with a transverse lower-segment scar. *American Journal of Obstetrics and Gynecology.* (1986), 155(5): 936-938.
48. Finnbogason, E.M. and Wiebe, S.D. *Liability and Compensation in Health Care.* A report to the conference of Deputy Ministers of Health of the Federal/Provincial/Territorial review on liability and compensation issues in health care. The legal liability on health care providers. (1990).
49. Flamm, B. Vaginal birth after cesarean section: controversies old and new. *Clinical Obstetrics and Gynecology.* (1985), 28(4): 735-744.
50. Flamm, B., Dunnett, C., Fischermann, E. and Quilligan, E. Vaginal delivery following cesarean section: use of oxytocin augmentation and epidural anesthesia with internal tocodynamic and internal fetal monitoring. *American Journal of Obstetrics and Gynecology.* (1984), 148(6): 759-763.
51. Flamm, B. and Goings, J. Vaginal birth after cesarean section: is suspected fetal macrosomia a contraindication? *Obstetrics and Gynecology.* (1989), 74: 694-697.
52. Flamm, B., Goings, J., Fuelberth, N., Fischermann, E., Jones, C. and Hersh, E. Oxytocin during labor after previous cesarean delivery: results of a multicenter study. *Obstetrics and Gynecology.* (1987), 70(5): 709-712.
53. Flamm, B., Lim, O.W., Jones, C., Fallon, D., Newman, L.A. and Mantis, J.K. Vaginal birth after cesarean section: results of a multicenter study. *American Journal of Obstetrics and Gynecology.* (1988), 158(5): 1079-1084.
54. Flamm, B., Newman, L., Thomas, S., Fallon, D. and Yoshida, M. Vaginal birth after cesarean section: results of a five-year multicenter collaborative study. *Obstetrics and Gynecology.* (1990), 76(5): 750-754.
55. Fraser, W. Toward a reduction in the rate of cesarean section for dystocia. Written submission to the Cesarean Birth Committee. (Nov. 30, 1989).
56. Fraser, W. Presentation on dystocia. (June 6, 1990).
57. Fraser, W., Usher, R., McLean, F., Bossenberry, C., Thomson, M., Kramer, M., Smith, L. and Power, H. Temporal variation in rates of cesarean section for dystocia. Does 'convenience' play a role? *American Journal of Obstetrics and Gynecology.* (1987), 300-304.
58. Gilbert, L., Saunders, N. and Sharp, F. The management of multiple pregnancy in women with a lower-segment caesarean scar. Is a repeat caesarean section really the 'safe' option? *British Journal of Obstetrics and Gynaecology.* (1988), 95: 1312-1316.
59. Gleicher, N. Cesarean section rates in the United States. *Journal of the American Medical Association.* (1984), 252: 3273-3276.
60. Goldman, L. Changing physicians' behavior (editorial). *New England Journal of Medicine.* (1990), 322(21): 1524-1525.
61. Gould, Jeffrey B., Davey, B. and Stafford, R. Socioeconomic differences in rates of cesarean section. *New England Journal of Medicine.* (1989) 324: 233-239.
62. Goyert, G., Bottoms, S., Treadwell, M. and Nehra, P. The physician factor in cesarean birth rates. *New England Journal of Medicine.* (1989), 320: 706-709.
63. Gluck, M. Canadian Medical Protective Association. Presentation of medicolegal concerns. (March 29, 1990).
64. Greer, Ann Lennarson. The state of the art versus the state of the science. *International Journal of Technology Assessment in Health Care.* (1988), 4(1): 5-26.
65. Hadley, C.B., Mennuti, M.T., Gabbe, S.G. An evaluation of the relative risks of a trial of labor versus elective repeat cesarean section. *American Journal of Perinatology.* (1986), 3(2): 107-114.
66. Halperin, M.E., Moore, D.C. and Hannah, W.J. Classical versus low-segment transverse incision for preterm caesarean section: maternal complications and outcome of subsequent pregnancies. *British Journal of Obstetrics and Gynaecology.* (1988) 95(10): 990-996.
67. Hangsleben, Karin Larson, Taylor, Margaret A. and Lynn, Nancy M. VBAC program in a nurse-midwifery service – five years of experience. *Journal of Nurse-Midwifery.* (1989), 34(4): 179-184.
68. Hannah, W., Bernstein, A., Gerulatjh, A., Paul, W. and Swales, J. Submission of Working Group of Obstetrics and Gynaecology to the Federal/Provincial/Territorial Review on Liability and Compensation Issues in Health Care. (Sept. 1988).
69. Hannah, W. Presentation to the cesarean birth committee on findings from physician survey for the Prichard Report. (April 20, 1990).
70. Hansell, R.S., McMurray, K.B., Huey, G.R. Vaginal birth after two or more cesarean sections: a five-year experience. *Birth* (1990), 17(3): 146-151.
71. Harding, P. Variations in rates of cesarean section (editorial). *Canadian Medical Association Journal.* (1985), 132: 241-242.
72. Harlass, F.E. and Duff, P. The Duration of labor in primiparas undergoing vaginal birth after cesarean delivery. *Obstetrics and Gynecology.* (1990), 75(1): 45-47.
73. Haynes, R., Davis, D., McKibbon, A., Tugwell, P. A critical appraisal of the efficacy of continuing medical education. *Journal of the American Medical Association.* (1984), 251(1): 61-64.
74. Hodnett, E. The environmental load of childbirth settings: development and testing of a measurement tool. *Nursing Papers.* (1987), 19(2): 3-15.
75. Hodnett, E. The effects of person-environment interactions on selected childbirth outcomes of women having home and hospital births. Unpublished Ph.D. dissertation, University of Toronto. (1983).
76. Hodnett, E. Personal control and the birth environment: comparisons between home and hospital settings. *Journal of Environmental Psychology.* (1989), 9: 207-216.
77. Hodnett, E. Patient control during labor: effects of two types of fetal monitors. *Journal of Obstetric, Gynecologic, and Neonatal Nursing.* (1982), 11(2), 94-99.
78. Hodnett, E. and Osborn, R.W. A randomized trial of the effects of monitrice support during labor: mothers' views two to four weeks postpartum. *Birth.* (1989), 16(4): 177-183.
79. Hodnett, E. and Osborn, R.W. The effects of continuous supportive professional care on childbirth outcomes. *Research in Nursing and Health.* (1989), 12: 289-297.
80. Hodosy, J. Presentation to the cesarean birth committee on managed care. (May 3, 1990).
81. Hofmeyr, G.J. External cephalic version at term. *Oxford Database of Perinatal Trials (Chalmers, I., ed.).* (1990), Version 1.2, Disk Issue 4, Record No. 3087.
82. Horenstein, J., Eglinton, G., Boucher, M., Tabilramaney, M. and Phelan, J. Oxytocin use during a trial of labor in patients with previous cesarean section. *Journal of Reproductive Medicine.* (1984), 29(1): 26-30.
83. Horenstein, J. and Phelan, J. Previous cesarean section: the risks and benefits of oxytocin usage in a trial of labor. *American Journal of Obstetrics and Gynecology.* (1985), 151(5): 564-569.
84. Huggins, G. and Rijhsinghani-Bhatia, A. Obstetrics and gynecology. *Journal of the American Medical Association.* (1990), 263(19): 2663-2665.
85. Hunter, D. Guidelines for the use of cervical and vaginal prostaglandins in the induction of labour. *Society of Obstetricians and Gynecologists of Canada Journal.* (May/1990), 9-11.
86. Hunter, D. and McDonald, H. (McMaster University). Presentation to the cesarean birth committee on dystocia. (June 6, 1990).

87. Hutton, E. The relationships among human support during childbirth, use of pharmacological support, and maternal childbirth satisfaction. Unpublished M.Sc.N. thesis, University of Toronto. (1985).
88. International Childbirth Education Association, Inc. Educational materials.
89. Jarrell, M.A., Ashmead, G.G. and Mann, L.I. Vaginal delivery after cesarean section: a five-year study. *Obstetrics and Gynecology* (1985), 65(5): 628-632.
90. Jencks, S. Quality assurance. *Journal of the American Medical Association.* (1990), 263(19): 2679-2680.
91. Johnson, S., Elkins, T., Strong, C. and Phelan, J. Obstetric decision making: responses to patients who request cesarean delivery. *Obstetrics and Gynecology.* (1986), 67: 847-850.
92. Kanouse, David E. and Jacoby, Itzhak. When does information change practitioners' behavior? *International Journal of Technology Assessment in Health Care.* (1988), 1(4): 27-33.
93. Kazandjian, V. and Summer, S. Evaluating the appropriateness of care: a study of cesarean section rates. *Quality Review Bulletin.* (July 1989), 206-214.
94. Kennell, J., Klaus, M., McGrath, S., Robertson, S. and Hinkley, C. Medical intervention: the effect of social support during labour (abstract). *Pediatric Research.* (1988), 23: 211A.
95. Keirse, M.J.N.C. Active management of prelabour rupture of membranes at term. *Oxford database of perinatal trials (Chalmers, I., ed.).* (1990), Version 1.2, Disk Issue 4, Record No. 3272.
96. Kirk, E., Doyle, K., Leigh, J. and Garrard, M. Vaginal birth after cesarean section or repeat cesarean section: medical risks or social realities? *Americal Journal of Obstetrics and Gynecology.* (1990), 162: 1398-1405.
97. Klaus, M., Kennell, J., Robertson, S. and Sosa, R. Effects of social support during parturition on maternal and infant morbidity. *British Medical Journal.* (1986), 293: 585-587.
98. Lao, T.T. and Leung, B.F.H. Labor induction for planned vaginal delivery in patients with previous cesarean section. *Acta Obstet Gynecol Scand.* (1987), 66: 413-416.
99. Lao, T.T., Leung, B.F.H. and Yeung, S.S. Trial of scar – is it safe in developing countries? *British Journal of Clinical Practice.* (1987), 41(2): 596-600.
100. Lavin, Justin P., Stephens, Robert J., Miodovnik, Menachem and Barden, Tom P. Vaginal delivery in patients with a prior cesarean section. *Journal of the American College of Obstetricians and Gynecologists.* (1982), 59(2): 135-148.
101. Lawson, G.W. Vaginal delivery after 3 previous caesarean sections. *Australian New Zealand Journal of Obstetrics and Gynaecology.* (1987), 27: 115-116.
102. Liswood, J. of Sawyers, Liswood and Scott. Presentation to the cesarean birth committee on liability and insurance issues. (April 20, 1990).
103. Lohr, K. Outcome measurement: concepts and questions. *Inquiry.* (1988), 25: 37-50.
104. Lomas, Jonathan (McMaster University). Policy commentary: quality assurance and effectiveness in health care: an overview. *CHEPA Working Paper Series #90-3.* (1990).
105. Lomas, Jonathan. Report of the international conference on quality assurance and effectiveness in health care. (Nov. 8,9,10/1989), Toronto.
106. Lomas, J., Anderson, G., Domnick-Pierre, K., Vayda, E., Enkin, M. and Hannah, W. Do practice guidelines guide practice? *New England Journal of Medicine.* (1989), 321: 1306-1311.
107. Lomas, J. and Enkin, M. Variations in operative delivery rates. *Effective Care in Pregnancy and Childbirth.* (1989), Oxford University Press; Oxford: 1182-1194.
108. Marieskind, H. Cesarean section in the United States: has it changed since 1979? *Birth.* (1989), 16(4): 196-202.
109. Martin, J., Morrison, J., Wiser, W. Vaginal birth after cesarean section: the demise of routine repeat abdominal delivery. *Obstetrics and Gynecology Clinics of North America.* (1988), 15(4): 719-736.
110. McKilligan, H. and Rush, J. Presentation to the cesarean birth committee on public health units and prenatal education. (April 20, 1990).
111. Meehan, F., Burke, G. and Kehoe, J. Update on delivery following prior cesarean section: a 15-year review 1972-1987. *International Journal of Gynecology and Obstetrics.* (1989), 30: 205-212.
112. Meier, P. and Porreco, R. Trial of labor following cesarean section: a two-year experience. *American Journal of Obstetrics and Gynecology.* (1982), 144: 671-678.
113. Ministry of Health. Mandatory health programs and services guidelines. (April 1989).
114. Ministry of Health. Schedule of benefits. (1989).
115. Ministry of Health. International Conference on Quality Assurance and Effectiveness in Health Care, Toronto – proceedings. (1989).
116. Molloy, B., Sheil, O. and Duignan, N. Delivery after cesarean section: review of 2176 consecutive cases. *British Medical Journal.* (June 1987), 294: 1645-1647.
117. Mootabar, H., Dwyer, J.F., Surur, F. and Dillon, T.F. Vaginal delivery following previous cesarean section in 1983. *International Journal of Gynecology and Obstetrics.* (1984), 22: 155-160.
118. Murphy, M. and Harvey, S. Choice of a childbirth method after cesarean. *Women and Health.* (1989), 15(2): 67-85.
119. Myers, S. and Gleicher, N. A successful program to lower cesarean section rates. *New England Journal of Medicine.* (1988), 319(23): 1511-1516.
120 Newton, E. and Higgins, C. Factors associated with hospital-specific cesarean birth rates. *Journal of Reproductive Medicine.* (1989), 34(6): 407-411.
121. Ngu, A. and Quinn, M.A. Vaginal delivery following caesarean section. *Australian New Zealand Journal of Obstetrics and Gynaecology.* (1985), 25: 41-43.
122. Nielsen, T.F., Ljungblad, U., Hagberg, H. Rupture and dehiscence of cesarean section scar during pregnancy and delivery. *American Journal of Obstetrics and Gynecology.* (1989), 160(3): 569-573.
123. Nielsen, T.F., Hokegard, K.H. and Moldin, P.G. X-ray pelvimetry and trial of labor after previous cesarean section: a prospective study. *Acta Ob Gyn Scand.* (1985), 64: 485-490.
124. Notzon, F. International differences in the use of obstetric interventions. *Journal of the American Medical Association.* (1990), 263 (24): 3286-3291.
125. Nova Scotia, Department of Health and Fitness. Report of the committee of inquiry into caesarean-section rates in Nova Scotia. (July 1990).
126. Novas, J., Myers, S. and Gleicher, N. Obstetric outcome of patients with more than one previous cesarean section. *American Journal of Obstetrics and Gynecology.* (1989), 160(2): 364-367.
127. O'Driscoll, K. and Foley, M. Correlation of decrease in perinatal mortality and increase in cesarean section rates. *Obstetrics and Gynecology.* (1983), 61(1): 1-5.
128. O'Driscoll, K. and Meagher, D. *Active Management of Labour.* (1980), London: W.B. Saunders: 78-81.
129. Ollendorff, D.A., Goldberg, J.M., Minogue, J.P. and Socol, M.L. Vaginal birth after cesarean section for arrest of labor: is success determined by maximum cervical dilatation during the prior labor? *American Journal of Obstetrics and Gynecology.* (1988), 159(3): 636-639.
130. Ophir, E., Oettinger, M., Yogoda, A., Markovits, Y., Rojansky, N. and Shapiro, H. Breech presentation after cesarean section: always a section? *American Journal of Obstetrics and Gynecology.* (1989), 161(1): 25-28.
131. Paul, R.H., Phelan, J.P. and Yeh, S. Trial of labor in the patient with a prior cesarean birth. *American Journal of Obstetrics and Gynecology.* (1985), 151(3): 297-304.
132. Personal communication. VBAC, AOM, Concerned Childbirth.
133. Phelan, J., Ock Ahn, M., Diaz, F., Brar, H. and Rodriguez, M. Twice a cesarean, always a cesarean? *Obstetrics and Gynecology.* (1989), 73(2): 161-165.
134. Phelan, J., Clark, S., Diaz, F. and Paul, R. Vaginal birth after cesarean. *Americal Journal of Obstetrics and Gynecology.* (1987), 157(6): 1510-1515.
135. Phelan, J., Eglinton, G., Horenstein, J. and Clark, S. Previous cesarean birth: trial of labor in women with macrosomic infants. *Journal of Reproductive Medicine.* (1984), 29(1): 36-40.
136. Philpott, R.H. and Castle, W.M. Cervicographs in the management of labour in primigravidae. I. The alert line for detecting abnormal labour. *Journal of Obstetrics and Gynaecology of British Commonwealth.* (1972), 79: 592-598.
137. Placek, R. and Taffel, S. Recent patterns in cesarean delivery in the United States. *Obstetrics and Gynecology Clinics of North America.* (1988), 15(4): 607-627.
138. Porreco, R. Meeting the challenge of the rising cesarean birth rate. *Obstetrics and Gynecology.* (1990), 75: 133-136.

139. Porreco, R. and Meier, P. Repeat cesareans – mostly unnecessary. *Contemporary Obstetrics and Gynecology.* (Sept. 1984), 55-63.
140. Prendergast, M.S. and Anderle, L.J. Experience with vaginal delivery after prior cesarean birth in a community hospital. *Journal of AOA.* (1985), 85(4): 238-240.
141. Prichard, J. Robert S. *Liability and Compensation in Health Care.* A report to the conference of Deputy Ministers of Health of the Federal/Provincial/Territorial review on liability and compensation issues in health care. (1990).
142. Pruett, K.M., Kirshon, B., Cotton, D.B., Poindexter, A.N. Is vaginal birth after two or more cesarean sections safe? *Obstetrics and Gynecology.* (1988), 72(2): 163-165.
143. Pruett, K.M., Kirshon, B. and Cotton, D.B. Unknown uterine scar and trial of labor. *American Journal of Obstetrics and Gynecology.* (1988), 159(4): 807-810.
144. Reid, A. and Galbraith, J. Midwifery in a family practice: a pilot study. *Canadian Family Physician.* (1988), 34: 1887-1890.
145. Rockenschaub, A. Technology-free obstetrics at the Semmelweis Clinic. *The Lancet.* (1990), 335:977-978.
146. Rourke, James. *Small hospital medical services in Ontario.* Report to the Ontario Medical Association. (Dec. 1989).
147. Sakala, E., Kaye, S., Murray, R.D. and Munson, L.J. Oxytocin use after previous cesarean: why a higher rate of failed labor trial? *Obstetrics and Gynecology.* (1990), 75(3:1): 356-359.
148. Sanchez-Ramos, L., Kaunitz, A.M., Peterson, H.B., Martinez-Schnell, B. and Thompson, R.J. Reducing cesarean sections at a teaching hospital. *American Journal of Obstetrics and Gynaecology.* (1990), 163(3): 1081-1088.
149. Sarno, A., Phelan, J., Ock Ahn, M. and Strong, T. Vaginal birth after cesarean delivery – trial of labor in women with breech presentation. *Journal of Reproductive Medicine.* (1989), 34(10): 831-833.
150. Schneider, J., Gallego, D. and Benito, R. Trial of labor after an earlier cesarean section – a conservative approach. *Journal of Reproductive Medicine.* (1988), 33(5): 453-456.
151. Schneider, J., Gallego, D. and Benito, R. Trial of labour in patients with a prior caesarean section and an intervening vaginal delivery. *Australian New Zealand Journal of Obstetrics and Gynaecology.* (1987), 27: 178-179.
152. Shepherd-McClain, C. Why women choose trial of labor or repeat cesarean section. *The Journal of Family Practice.* (1985), 21(3): 210-216.
153. Shepherd-McClain, C. Women's choices for trial of labor or repeat cesarean section. Proceedings from Tri-Regional Conference on Completed MCH Research. (1988), 70-85.
154. Shepherd-McClain, C. Patient decision making: the choice of delivery method after a previous cesarean section. *Culture, Medicine and Psychiatry.* (1987), 11: 495-508.
155. Silver, R.K. and Gibbs, R.S. Predictors of vaginal delivery in patients with a previous cesarean section who require oxytocin. *American Journal of Obstetrics and Gynecology.* (1987), 156(1): 57-60.
156. Singh, T., Kishor, C., Barman, S.D. and Gupta, A.N. Study of vaginal delivery in patients with one previous lower segment caesarean section. *Australian New Zealand Journal of Obstetrics and Gynaecology.* (1986), 26(4): 245-248.
157. Society of Obstetricians and Gynaecologists of Canada. Vaginal birth after cesarean section. *SOGC Bulletin.* (1986), 8:1, 8-11.
158. Sosa, R., Kennell, J., Klaus, M., Robertson, S., and Urrutia, J. The effect of a supportive companion on perinatal problems, length of labor, and mother-infant interaction. *New England Journal of Medicine.* (1980), 303: 597-600.
159. Stafford, R. Alternative strategies for controlling rising cesarean section rates. *Journal of the American Medical Association.* (1990), 263(5): 683-687.
160. Stewart, P., Dulberg, C., Chapman Arnill, A., Elmslie, T. and Hall, P. Diagnosis of dystocia and management with cesarean section among primiparous women in Ottawa-Carleton. *Canadian Medical Association Journal.* (1990), 142(5): 459-463.
161. Stovall, T.G., Shaver, D.C., Solomon, S.K. and Anderson, G.D. Trial of labor in previous cesarean section patients, excluding classical cesarean sections. *Obstetrics and Gynecology.* (1987), 70(5): 713-717.
162. Strong, T., Phelan, J., Ock Ahn, M., Sarno, A. Vaginal birth after cesarean delivery in the twin gestation. *American Journal of Obstetrics and Gynecology.* (1989), 161(1): 29-32.
163. Thacker, S. The efficacy of intrapartum electronic fetal monitoring. *American Journal of Obstetrics and Gynecology.* (1987), 156(1): 24-30.
164. Thorp, J., Parisi, V., Boylan, P. and Johnston, D. The effect of continuous epidural analgesia on cesarean section for dystocia in nulliparous women. *American Journal of Obstetrics and Gynecology.* (1989), 161: 670-675.
165. Turner, M., Brassil, M. and Gordon, H. Active management of labor associated with a decrease in the cesarean section rate in nulliparas. *Obstetrics and Gynecology.* (1988), 71(2): 150-154.
166. Van Gelderen, C.J., England, M.J., Naylor, G.A. and Katzeff, T.C. Labour in patients with a caesarean section scar: the place of oxytocin augmentation. *South Africa Medical Journal.* (1986), 70: 529-532.
167. Van Amerongen, D. Vaginal birth after cesarean section – experience in a community-based practice. *Journal of Reproductive Medicine.* (1989), 34(8): 531-534.
168. VBAC Association of Ontario. *Once a Cesarean **Not** Always a Cesarean.*
169. Wennberg, J. Improving the medical decision-making process. *Health.* (1988), 7(1): 99-106.
170. Whiteside, D.C., Mahan, C.S. and Cook, J.C. Factors associated with successful vaginal delivery after cesarean section. *Journal of Reproductive Medicine.* (1983), 28(1): 785-788.
171. Wilbur, R. *Innovations in health care measurement.* Chicago, IL: American Hospital Association Publishing. (1989), 145-150.
172. Wilf, R.T. and Franklin, J.B. Six years' experience with vaginal births after cesareans at Booth Maternity Center in Philadelphia. *Birth.* (1984), 11(1): 5-9.
173. Williams, R.L. and Chen, P.M. Identifying the sources of the recent decline in perinatal mortality rates in California. *New England Journal of Medicine.* (1982), 306: 207-214.
174. Wilson, C. *Hospital Wide Quality Assurance: Models for Implementation and Development.* Toronto: W.B. Saunders Canada. (1987), Chapters 4-7.
175. World Health Organization (The). The Partograph – section I, the principle and strategy. (1988).
176. World Health Organization (The). The Partograph – section III, the facilitator's guide. (1989).
177. World Health Organization (The). The Partograph – section IV, guidelines for operations research on the application of the partograph. (1989).
178. Yeh, S., Huang, Z. and Phelan, J. Postterm pregnancy after previous cesarean section. *Journal of Reproductive Medicine.* (1984), 29(1): 41-44.
179. Yetman, T. and Nolan, T. Vaginal birth after cesarean section: a reappraisal of the risk. *American Journal of Obstetrics and Gynecology.* (1989), 161(5): 1119-1123.
180. Zdeb, M. and Logrillo, V. Cesarean childbirth in New York State: trends and directions. *Birth.* (1989), 16(4): 203-207.

Consensus Conference Report

Appendix I

Indications for Cesarean Section: Final Statement of the Panel of the National Consensus Conference on Aspects of Cesarean Birth*

The bibliographies on which these papers were based are available from the planning committee on request.

Panel members: *Walter J. Hannah, professor and chairman, Department of Obstetrics and Gynecology, University of Toronto; Tom F. Baskett, associate professor, Department of Obstetrics and Gynecology, Dalhousie University, Halifax; Graham W. Chance, professor, departments of Paediatrics and of Obstetrics and Gynecology, University of Western Ontario, London, Ont.; Emily F. Hamilton, assistant professor, Department of Obstetrics and Gynecology, McGill University, Montreal; Shirley Huchcroft, Alberta Cancer Board, Calgary; James F. King, assistant professor, Department of Obstetrics and Gynecology, University of British Columbia, Vancouver; Bertrand Proulx, chief of staff, Notre Dame Hospital, Hearst, Ont.; Faye Ryder, Maple Ridge, BC; Margaret A. Somerville, professor, faculties of Law and Medicine, McGill University, Montreal; and Peter A. Woodrow, associate professor and teaching professor, Department of Obstetrics and Gynecology, University of Saskatchewan, Regina.* ***Planning committee:*** *Jonathan Lomas, Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Ont.; Eugene Vayda, associate dean, Division of Community Health, University of Toronto; Murray W. Enkin, professor, departments of Obstetrics and Gynecology and of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton; Geoffrey M. Anderson, assistant professor, Department of Epidemiology and Community Medicine, University of Ottawa; Betsy MacKinnon, Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton; Janet Barnsley, Division of Community Health, University of Toronto; and Lynda Marsh, Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton.*

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In May 1985 a Canadian consensus process, modified from the approach developed by the US National Institutes of Health,[1] was started to establish appropriate clinical policies for aspects of cesarean birth. The planning committee, with the cooperation of the Society of Obstetricians and Gynaecologists of Canada and the Association of Professors of Obstetrics and Gynaecology, appointed a 10-member panel – 5 obstetricians, 1 general practitioner, 1 neonatologist, 1 epidemiologist, 1 lawyer and 1 consumer – selected from across the country. Between May and October the planning committee and its staff provided the panel with the following four background papers, which reviewed all the relevant literature published since 1960.

- Cesarean section rates in Canada: a review of the data
- Indications for cesarean section for women with breech presentation: a review of the literature
- Indications for cesarean section for women with previous cesarean section: a review of the literature
- Criteria used for the diagnosis of dystocia: a review of approaches

In October the panel convened for 3 days to hear evidence from expert witnesses from Canada, the United States and Great Britain, to hear the views of interested consumers and health care professionals, to consider written briefs and to complete an interim statement. Between October 1985 and February 1986 the planning committee circulated the interim statement to over 30,000 individuals or organizations for their comments. The final statement was written by the panel in February, after

consideration of these comments and reactions to the interim statement. The Society of Obstetricians and Gynaecologists of Canada and the Association of Professors of Obstetrics and Gynaecology have fully endorsed the final statement and have urged implementation of all its recommendations.

Background

The public and the providers of obstetric care share an interest in and concern with the recent trends in cesarean birth rates in Canada. Although the maternal and perinatal mortality rates in Canada are comparable to those in European countries reporting the lowest rates, our cesarean birth rates are approximately twice as high (currently nearly 20%). The issues raised deserve careful examination in order to reduce unnecessary surgical intervention and to promote the safest forms of birth for Canadian women and their babies. It was the purpose of the National Consensus Conference on Aspects of Cesarean Birth to provide this examination.

The panel addressed four questions, and its response to these questions formed the basis of an interim consensus statement. It must be emphasized that in addressing these questions the panel was influenced primarily by convincing evidence from the research literature. The panel was given invaluable assistance in the literature review by the planning committee, which acted as a resource in assessing the strength of the data.

Four months after the development of the interim statement, the consensus panel reconvened to review the documents received in response to the statement. The documents included submissions from provincial medical associations, consumer groups and individuals, epidemiologists, medical practitioners, nurses and midwives across the country. The interim statement was then reviewed by the panel in light of the submissions received. All the points raised by the respondents were considered, and many were incorporated into the final statement.

The four questions considered by the panel were as follows.

- For which women and under what conditions should vaginal birth be planned in the circumstances of breech presentation?
- For which women and under what conditions should a trial of labour be carried out for women with a previous cesarean section?
- What criteria must be present to warrant a diagnosis of dystocia (prolonged or difficult labour)?
- What future research is required to clarify the use of cesarean section in deliveries involving breech presentation, previous cesarean section or dystocia?

Designation of Appropriate Hospital Facilities

Before answering the four questions, the panel decided that it was necessary to make a statement about the resources required in hospitals so that the opportunity for safe labour and delivery can be offered to all women, particularly those with breech presentation or previous cesarean section.

To place the risks associated with deliveries involving previous cesarean section in the context of the risks associated with all forms of childbirth, the panel reviewed relevant data. On the basis of 11,819 births at a Canadian teaching centre[2], the probability of emergency cesarean section being required for fetal distress, cord prolapse or antepartum hemorrhage was 2.70% (95% confidence interval [CI], 2.41% to 2.99%). In comparison, the rates of uterine rupture (excluding asymptomatic dehiscence) in women with a previous low-segment transverse cesarean section have been reported from four prospective studies[3-6]. The rate for those with a singleton vertex presentation who underwent a trial of labour was 0.22% (5/2268) (95% CI, 0.03% to 0.41%). The estimated* maternal morbidity rate was 22.90% (95% CI, 17.90% to 27.97%) in the elective cesarean section group and 18.25% (95% CI, 16.66% to 19.84%) in the trial-of-labour group (which included those with vaginal births and those having cesarean section who were in labour). The perinatal mortality rate was too low in each group to allow meaningful conclusions to be drawn about any differences between the two groups.

The panel recognized that rupture of the lower uterine segment may occasionally be catastrophic for the woman and her infant, although this event occurs much less frequently than other acute obstetric emergencies. Therefore, hospitals providing obstetric care should ensure the availability of blood, operating rooms, neonatal resuscitation, and nursing, anesthetic and surgical personnel so that a cesarean section can be started within approximately 30 minutes for any woman in labour, including a woman undergoing a trial of labour.

The panel also recognized that in a country as vast as Canada there are small hospitals without such resources, especially in remote areas. Nevertheless, by selecting and transferring women with high-risk pregnancies for management in other appropriate facilities, these small hospitals continue to provide valuable obstetric services to women in their communities. Such hospitals cannot be expected to electively manage breech delivery or trial of labour.

Terminology

The panel was aware that the terminology used is not always neutral. There was consensus,

** We say "estimated" because these are likely overestimates, since it was assumed that each event (fever, hemorrhage, pulmonary embolism and so forth) occurred in separate people; however, presumably some people suffered more than one morbid event. Hence, these data do not represent the proportion of women who suffered these events but, rather, the total number of events as a proportion of the total number of women.*

however, that for ease and accuracy of communication commonly used terminology such as "trial of labour" would be used in the consensus statement, although some people object to some connotations of such terms. This use should not be taken as an endorsement by the panel of the continued use of this terminology, and the panel suggested that more acceptable alternatives should be considered.

Questions Addressed

For which women and under what conditions should vaginal birth be planned in the circumstances of breech presentation?
There has been an increasing trend in Canada toward universal performance of cesarean section for breech presentation. Extensive review of the research literature has failed to uncover any evidence to support this trend. Therefore, cesarean section should not be performed for breech presentation unless it can be shown to be justified. That is, the panel has assumed that cesarean section is not indicated merely because the presentation is breech.

All the recommendations that follow refer to singleton breech pregnancies. If the evidence is compelling that one method of delivery is safer than another, the panel states that such a method should be *recommended;* if the evidence is less compelling but favours one method of delivery over another the panel states that such a method should be *offered.*

Frequently, there is uncertainty in recognizing the precise risks and benefits of the options for delivery in the case of breech presentation. This uncertainty arises from the paucity and equivocal nature of the research data regarding the relative risks and benefits of the different interventions. In particular, there is no research evidence to either support or refute the value of pelvimetry in the assessment of the safety of vaginal breech delivery. Although in practice planned vaginal birth is more likely to be offered to women with previous deliveries, no evidence was found in the literature to justify such a distinction.

Since the estimation of birth weight is necessarily imprecise, the following recommendations are based largely on evidence derived from actual rather than estimated birth weight. Therefore, ranges of estimated fetal weight and gestational age are given to guide the clinician in individual circumstances.

Recommendations

1 Planned vaginal birth should be *recommended* for either frank or complete breech presentation at 36 weeks' or more gestation and/or when the estimated birth weight is 2500 to 4000 g.

2 Because there was less certainty about the strength of the data, planned vaginal birth should be *offered* for either frank or complete breech presentation at 31 to 35 weeks' gestation and/or when the estimated birth weight is 1500 to 2500 g.

3 Cesarean section should be *offered* (but again there was less certainty about the adequacy of the data) for either frank or complete breech presentation at 30 weeks' or less gestation and/or when the estimated birth weight is less than 1500 g.

4 There was insufficient data on which to base a recommendation for frank or complete breech presentation when the estimated birth weight is more than 4000 g. The attending physician's judgement about the most appropriate course of action should determine which delivery method is suggested.

5 Consensus was reached on the basis of clinical experience only (because the available data were inadequate) that cesarean section should be recommended for footling breech presentation.

6 Recommendations 1 through 5 will require modification in the presence of complicating factors, including oligohydramnios and hyperextension of the fetus's head, both of which would tend to favour cesarean section, and fetal congenital anomaly, which would tend to favour vaginal birth.

7 Apart from exceptional circumstances involving the delivery of the second twin, the panel reached consensus (on the basis of clinical experience) that total breech extraction in singleton breech presentation has virtually no place in modern obstetric practice.

8 The panel emphasizes that the experience of the attending physician is a crucial factor affecting the decision for planned vaginal breech birth and that medical education programs should promote the acquisition and maintenance of the skills required for safe vaginal breech birth.

For which women and under what conditions should a trial of labour be carried out for women with a previous cesarean section?
The following recommendations are based on firm evidence from the literature. In addition, the panel considered a number of areas in which the evidence was less compelling. The panel therefore notes the following:

a) a trial of labour after more than one cesarean section may be a reasonable alternative to repeat elective cesarean section, but to date there are not sufficient data to confirm or refute this;
b) there is insufficient evidence to make a recommendation regarding a trial of labour with twins or with breech presentation;
c) although the data on oxytocin stimulation are reassuring, more information is necessary, and in the meantime oxytocin should be used with caution; and
d) there are insufficient data in the literature to allow comment on induction of labour.

Recommendations

1 A trial of labour after a previous cesarean section should be recommended for

women who meet all the following criteria: one low transverse cesarean section, a singleton vertex presentation and no absolute indication for cesarean section (such as placenta previa). The data indicate that women who have previously had a vaginal birth as well as a cesarean section are particularly likely to give birth vaginally. The likelihood of vaginal birth after cesarean section appears to be independent of the indication for the first cesarean section (including "cephalopelvic disproportion" and "failure to progress"). Suspected fetal macrosomia (birth weight over 4000 g) is not in itself a contraindication to a trial of labour.

2 A history of classic, low vertical or unknown uterine incision or hysterotomy remains a contraindication to a trial of labour.

3 Epidural anesthesia may be used for the usual obstetric indications.

4 In addition to the recommendations made under "Designation of appropriate hospital facilities", the panel recommends the following:

a) antenatal evaluation by a qualified obstetrician,
b) intrapartum notification of and/or consultation with the obstetrician or surgeon and the anesthetist to be involved in an emergency and
c) skilled evaluation of labour and routine maternal and fetal surveillance.

In addition, the panel feels that the continuous presence of the physician during labour is not necessary. Continuous electronic monitoring of the fetal heart rate is not routinely indicated; however, minimum standards for recording the fetal heart rate in labour should be followed (i.e., auscultation after a contraction every 15 minutes in the active phase of the first stage of labour and every 5 minutes in the second stage).

5 Adequate information should be provided so that a woman can make an informed decision on the choice between repeat elective cesarean section and trial of labour. Every effort should be made to accommodate this decision. Physicians working in hospitals that are unable to fulfil the woman's wishes should so inform the patient and advise her of the nearest facility that can.

What criteria must be present to warrant a diagnosis of dystocia (prolonged or difficult labour)?

The term dystocia is generally used to encompass labour that is considered abnormally slow or "nonprogressive". In relation to cesarean section the diagnoses "cephalopelvic disproportion" and "failure to progress" have been grouped together as "dystocia" and, as such, are reported as the indication for approximately half of all primary cesarean sections. Thus, directly, and indirectly through its contribution to repeat cesarean section, dystocia as it is currently diagnosed accounts for 50% to 60% of all cesarean sections in Canada.

To avoid the confusion of different diagnostic and management categories, women with malpresentation, multiple pregnancy, preterm labour or fetal distress, and those undergoing induction of labour are excluded. Moreover, because dystocia is almost exclusively diagnosed in nulliparous women, this statement is confined to nulliparous women at term with a single, vertex presentation in spontaneous labour, who represent approximately one third of the obstetric population.

The following observations and recommendations regarding dystocia are based largely on informed clinical opinion because of the paucity of adequate scientific evidence. Therefore, they should be regarded as working guidelines.

Guidelines

1 Before a diagnosis of dystocia is considered, the woman must be in established labour; the latent phase of labour is *not* considered established labour. Established labour is diagnosed in the presence of painful, regular uterine contractions and cervical effacement with at least 3 cm dilation. Rupture of the membranes or a bloody "show", or both, may be contributory but are not in themselves diagnostic of established labour.

2 Slow progress in labour is not necessarily a problem in itself, but it is the best available indicator in women in whom dystocia is likely to develop. In the first stage of established labour a diagnosis of dystocia is warranted if there is a lack of progressive cervical dilation (less than 0.5 cm/h) over a 4-hour period.

3 The causes of dystocia, the commonest of which is ineffective uterine action, should be sought. Such a diagnostic approach will identify women with dystocia at an early stage and allow management options (e.g., oxytocin augmentation, hydration, change of position or ambulation) aimed at correcting ineffective uterine action. In some women no intervention is indicated. In all cases of nonprogressive labour careful surveillance of the fetal heart rate is indicated, as outlined in recommendation 4 in the preceding section.

4 At this early stage cesarean section is not appropriate. It should be considered much later, and then only after satisfactory augmentation of uterine action has failed to secure progress after a reasonable time.

5 While there is cause for concern if the second stage of labour exceeds the usually accepted duration, no strict time limits should be set as long as there is progressive descent of the fetus's head and no sign of fetal compromise. In particular, slow, progressive descent with epidural analgesia does not require early operative intervention. Maternal expulsive efforts should not be encouraged until the fetus's head has descended to the pelvic floor.

6 If, in the presence of adequate uterine action, there

is lack of descent and increasing "caput" and moulding, the diagnosis of cephalopelvic disproportion is confirmed.

What future research is required to clarify the use of cesarean section in births involving breech presentation, previous cesarean section or dystocia?

From the evidence considered by the panel it became obvious that further research is required in many areas, including the following.

Breech presentation

Randomized controlled trials are essential to determine the efficacy and safety of external cephalic version as well as other measures that could reduce the number of breech births and to determine the most appropriate mode of birth when the fetus weighs less than 1500 g.

Previous cesarean section

Appropriately designed studies should be conducted to assess the frequency of major complications in the mother, perinatal mortality, and short-term and long-term sequelae for the child in the following circumstances.

- Trial of labour after more than one low transverse cesarean section.
- Trial of labour with breech presentation or twins after low transverse cesarean section.
- Oxytocin augmentation of labour after low transverse cesarean section.
- Induction of labour after low transverse cesarean section.

In addition, equally rigorous studies should be carried out to assess the effect on the outcome of labour of continuous support by nurses or others and to measure psychosocial consequences not only for the woman but also for the child and the family of women undergoing a trial of labour as opposed to elective cesarean section.

Dystocia

Studies should be done to assess:

a) the specificity and sensitivity of the proposed working guidelines for the diagnosis of dystocia as predictors of the need for cesarean section,
b) the value of early correction of ineffective uterine action in the prevention and management of dystocia, and
c) the value of alternative methods (e.g., ambulation, nipple stimulation and change of position in labour) for the prevention and management of dystocia.

General

A representative population survey of women who have given birth by cesarean section and of women who have delivered vaginally should be done to assess their levels of satisfaction and preference for subsequent birth. In addition, regional and national studies of changes in obstetric practice pertaining to cesarean section in the next decade are needed.

Medicolegal Considerations

The panel was aware of the complex and difficult medicolegal issues raised in the four questions considered. The legal advice available to the panel indicated that careful review with the woman of the risks and benefits to her and her infant associated with different delivery methods is essential to informed consent. Informed consent and its documentation are the over-riding legal considerations.

The panel recognized that there is widespread and understandable concern on the part of obstetric practitioners about the medicolegal aspects of pregnancy and childbirth. Many physicians feel that some clinical decisions are unduly influenced by potential litigation pressures and by consumer expectations, which are sometimes unrealistic. The combination of these influences has contributed to the rising rates of cesarean section in the three areas considered by the panel.

This consensus statement is the result of a systematic review of the best available evidence and may serve as a reasonable and defensible basis for clinical practice.

Special thanks are owed to Dr. Friederike Perl, McMaster University, for her work on dystocia and her other significant contributions to the consensus process; Professor Robin F. Roberts, McMaster University, for his extensive analysis of the data for the consensus panel; Dr. Michael Q. Ramsden, McMaster University, for his design and application of the panel's decision-analytic models; and Jerry Elliott and Dr. Itzhak Jacoby, US National Institutes of Health, for their advice and assistance on the consensus technique.

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References

1. Jacoby I: The consensus development program of the National Institutes of Health. Current practices and historical perspectives. *Int J Tech Assess Health Care* 1985; 2: 420-432.
2. Cohen MM, Ong B, Palahniuk R et al: Obstetrical anesthesia and cesarean section. Presented at the National Consensus Conference on Aspects of Cesarean Birth, Niagara-on-the-Lake, Ont, Oct 24-26, 1985.
3. Gibbs CE: Planned vaginal delivery following cesarean section. *Clin Obstet Gynecol* 1980; 2: 507-515.
4. Martin JN, Harris BA, Huddleston JF et al: Vaginal delivery following previous cesarean birth. *Am J Obstet Gynecol* 1983; 146: 255-263.
5. Meier PR, Porreco RP: Trial of labour following cesarean section: a two year experience. *Am J Obstet Gynecol* 1982; 144: 671-678.
6. Paul RH, Phelan JP, Yeh S: Trial of labour in the patient with a prior cesarean birth. *Am J Obstet Gynecol* 1985; 151: 297-304.

Biographies of Committee Members

Appendix II

Members of the Cesarean Birth Quality Assurance Committee

J. Kenneth Milne, Chairman
Dr. Milne is a Professor in the Department of Obstetrics and Gynaecology, University of Western Ontario, and Chief of the Department of Obstetrics and Gynaecology, St. Joseph's Health Centre. Dr. Milne is currently Vice President of the Society of Obstetricians and Gynaecologists of Canada (SOGC) and is past Chairman of the Ontario Section of SOGC. Dr. Milne is a committee member of the Ontario Medical Association (OMA), Section of Obstetrics and Gynaecology, and as well serves on the OMA's Midwifery Committee.

Dr. Milne's involvement with provincial and national professional organizations has provided a venue for his participation in programs of continuing medical education on the topic of quality assurance programs for practising physicians in obstetrics and gynaecology.

Dr. Milne lives in the London area and is the father of five.

Gloria Crotin
Ms Crotin is President and Chief Executive Officer of York Central Hospital in Richmond Hill. She is a member of the Canadian College of Health Service Executives and serves on its Toronto Chapter Executive. As well she is a Fellow of the American College of Health Care Executives. Ms Crotin represented the Ontario Hospital Association on the Committee.

Rachel Edney
Dr. Edney is a family practitioner affiliated with Etobicoke General Hospital. Obstetrics is an important part of her practice and she currently attends at about 70 births per year. Dr. Edney is a member of the College of Family Physicians of Canada and was president of the London Chapter in 1966. From 1981-1984 she served on the Executive of the Ontario Chapter and was president during 1984-85. In 1989, Dr. Edney was elected to the Council of the College of Physicians and Surgeons and to its Executive Committee in 1990.

Dr. Edney lives in Toronto and is the mother of four.

Rudy Gasparelli
Dr. Gasparelli is a family physician (and pilot) in Wawa, Ontario, with several years experience in Northern and remote areas of Canada. He has served as a coroner in Ontario since 1984 and is active in the District Health Council and development of a Comprehensive Health Organization in Wawa. He is a member of the College of

Family Physicians of Canada. Dr. Gasparelli is the father of three.

Linda Gerry
Ms Gerry's educational background is in nursing and social work. She is employed as a family counsellor with children's mental health services (Sudbury) and as a faculty consultant to social work students at Laurentian University, and does private work as a social worker. Ms Gerry is the mother of two with a strong interest in promoting birth as a normal physiological process. Ms Gerry is a co-founder of the consumer group "Childbirth Concerns", founder of the VBAC support group in Sudbury area, an affiliate of the VBAC Association of Ontario, a member of the Reproductive Care Committee of the Sudbury General Hospital, and a member of the Midwifery Task Force in Sudbury.

Paul Hergott
Dr. Hergott is a practising obstetrician from Sault Ste. Marie; Chief of Obstetrics and Gynaecology at the General Hospital in Sault Ste. Marie and current Chairman of the Ontario Region for the Society of Obstetricians and Gynaecologists of Canada. He is a Clinical Lecturer in the Department of Family Medicine at the University of Western Ontario, supervising resident training in Sault Ste. Marie.

Dr. Hergott is the father of three children and actively involved in health issues and other community activities in Sault Ste. Marie.

Karen McArthur
Dr. McArthur is an Assistant Professor of Family Medicine, University of Toronto. She practises at the St. George Health Centre and is associated with the Toronto Hospital where she is Section Head for the Family Practice obstetrical group. She actively promotes a "low risk" approach to obstetric care and includes medical students, interns and residents in her practice. Dr. McArthur is a member of the College of Family Physicians of Canada.

Carl Nimrod
Dr. Nimrod is a professor in Obstetrics and Gynaecology at the University of Ottawa and Head of the Division of Perinatology. He is currently a member of the Reproductive Care Committee of the Ontario Medical Association and was the Ontario Medical Association representative on the Cesarean Birth Quality Assurance Committee. Dr. Nimrod is the father of three children.

Wendy Russell
Ms Russell has a Bachelor of Science in Nursing from McMaster University and a broad experience in labour and delivery in both teaching and community hospitals. Ms Russell has worked as a staff nurse in labour and delivery and as nurse manager. She is presently in this position at Peel Memorial Hospital, Brampton, Ontario. Ms Russell is a member of the Registered Nurses' Association of Ontario. Ms Russell is the mother of two children.

Caroline Sufrin-Disler
Ms Sufrin-Disler is co-ordinator of the VBAC association of Ontario, a founder and co-director of VBAC/AVAC Canada, Canada's Director of the Cesarean Prevention Movement and a member of the cesarean options committee of the International Childbirth Education Association (ICEA). She authored an extensive review of the medical literature on VBAC, published by ICEA in 1990.
Ms Sufrin-Disler is the mother of four; her youngest son, David, frequently accompanied her to meetings of the Cesarean Birth Quality Assurance Committee.

Martha Forestell
Ms Forestell is Head of the Women's Health Bureau, Ministry of Health, and provided expertise on women's health issues as well as Ministry of Health resources to the Cesarean Birth Quality Assurance Committee.

Karyn Kaufman
Dr. Kaufman is Associate Professor, McMaster University School of Nursing and Midwifery Co-ordinator at the Ministry of Health. She was Coordinator of the Cesarean Birth Quality Assurance Committee and principal liaison to the Ministry of Health.

Presentations and Consultations

Appendix III

Consultants who made presentations to the Cesarean Birth Quality Assurance Committee

Presentation by Cesarean Section Consensus Statement Implementation Project (CSIP), McMaster University and University of Toronto, Dr. Murray Enkin, Ms. Mary Gauld and Dr. Walter Hannah, March 28, 1990.

Presentation on Medico-legal Concerns, Dr. Manny Gluck, Canadian Medical Protective Association, March 29, 1990.

Presentation of Findings from the Survey of Obstetricians for the Prichard Report, Dr. Walter Hannah, April 20, 1991.

Standards of Care and Professional Liability, Mr. Josh Liswood of Sawers, Liswood and Scott, April 20, 1990.

Prenatal Programs in Health Units, Dr. Helen McKilligan and Ms Janet Rush, April 20, 1990.

The Managed Care Approach to Quality Assurance, Jake Hodosy, May 3, 1990.

Continuing Medical Education, Dr. Dave Davis, McMaster University, June 5, 1990.

Randomized Trial on Active Management of Labour, Dr. David Hunter and Ms Helen McDonald, McMaster University, June 6, 1990.

Dystocia and Its Implications for Cesarean Birth, Dr. William Fraser, Laval University, Quebec, June 6, 1990.

Cesarean Section Clinical Audit, Dr. Karen Campbell and Ms Karen Webster, Lawson Research Institute, London, Ontario, September 6, 1990.

Cesarean Rates of Ontario Hospitals 1988/89

Appendix IV

Reported Total Births and Cesareans Ontario Hospitals 1988/89

Hospital	With Cesarean Section	Total Obstetric Cases	% of Cesarean
Brantford General	203	1,430	14.2%
Kincardine and District General	19	125	15.2%
Southampton Saugeen Memorial	0	98	0.0%
Walkerton County of Bruce General	42	217	19.4%
Wiarton Bruce Peninsula Health Services	0	81	0.0%
Orangeville Dufferin Area	167	593	28.2%
St. Thomas Elgin General	133	805	16.5%
Leamington District Memorial	108	455	23.7%
Windsor Metropolitan General	278	1,921	14.5%
Windsor Salvation Army Grace	449	2,093	21.5%
Kingston General	355	2,242	15.8%
Durham Memorial	4	24	16.7%
Hanover and District	34	166	20.5%
Markdale Centre Grey General	17	80	21.3%
Meaford General	22	75	29.3%
Owen Sound Grey Bruce Regional Health Centre	214	704	30.4%
Dunnville Haldimand War Memorial	49	183	26.8%
Haliburton	0	18	0.0%
Burlington Joseph Brant Memorial	309	1,632	18.9%
Halton Hills, Georgetown and District Memorial	43	264	16.3%
Milton District	71	332	21.4%
Oakville-Trafalgar Memorial	510	1,771	28.8%
Belleville General	318	1,459	21.8%
Trenton Memorial	42	269	15.6%
Clinton Public	27	187	14.4%
Goderich Alexandra Marine and General	19	91	20.9%
Seaforth Community	1	20	5.0%
Wingham and District	13	171	7.6%

Hospital	With Cesarean Section	Total Obstetric Cases	% of Cesarean
Chatham Public General	240	1,150	20.9%
Wallaceburg Sydenham District	40	249	16.1%
Petrolia Charlotte Eleanor Englehart	22	138	15.9%
St Catharines General	333	2,145	15.5%
Welland County General	176	837	21.0%
Simcoe Norfolk General	122	458	26.6%
Cobourg District General	83	391	21.2%
Port Hope and District	25	163	15.3%
Ajax and Pickering General	223	1,453	15.3%
Newcastle Memorial	51	248	20.6%
Oshawa General	465	2,872	16.2%
Scugog Community Memorial	14	166	8.4%
Uxbridge Cottage	13	76	17.1%
Ottawa Hôpital Montfort	124	727	17.1%
Ottawa Civic	774	3,401	22.8%
Ottawa Riverside	333	1,815	18.3%
Ottawa Salvation Army Grace	296	1,951	15.2%
Ottawa General	452	2,290	19.7%
Ingersoll, Alexandra	16	98	16.3%
Tillsonburg District Memorial	35	224	15.6%
Woodstock General	91	609	14.9%
Peel Memorial	581	2,783	20.9%
Mississauga Hospital	495	2,450	20.2%
Listowel Memorial	12	200	6.0%
St. Marys Memorial	3	122	2.5%
Stratford General	95	609	15.6%
Peterborough Civic	266	1,738	15.3%
Hawkesbury District General	82	359	22.8%
Picton Prince Edward County Memorial	0	97	0.0%
Arnprior District Memorial	19	82	23.2%
Barry's Bay St. Francis	0	45	0.0%
Deep River and District	0	29	0.0%

Hospital	With Cesarean Section	Total Obstetric Cases	% of Cesarean
Pembroke General	107	739	14.5%
Renfrew Victoria	36	157	22.9%
Alliston Stevenson	93	341	27.3%
Barrie Royal Victoria	243	1,244	19.5%
Collingwood General and Marine	60	347	17.3%
Midland Huronia	80	278	28.8%
Sarnia St. Joseph's	277	1,495	18.5%
Almonte General	32	181	17.7%
Perth Great War Memorial	38	174	21.8%
Smiths Falls Community	45	235	19.1%
Brockville General Hospital	147	618	23.8%
Kemptville District	5	24	20.8%
Lennox and Addington	32	158	20.3%
Toronto East General	454	2,321	19.6%
Etobicoke General	735	2,836	25.9%
Etobicoke Queensway General	288	1,170	24.6%
North York Branson	301	1,304	23.1%
North York General	595	3,646	16.3%
North York Finch	439	2,047	21.4%
Scarborough Central	586	2,920	20.1%
Scarborough General	542	2,186	24.8%
Toronto Central Hospital	129	392	32.9%
Toronto Doctor's Hospital	276	1,430	19.3%
Toronto Mount Sinai	931	4,571	20.4%
Toronto St. Joseph's Health Centre	473	2,339	20.2%
Toronto St. Michael's	567	2,175	26.1%
Toronto General	799	3,594	22.2%
Toronto Wellesley	370	1,798	20.6%
Toronto Women's College	796	3,383	23.5%
York Humber Memorial	190	969	19.6%
York Northwestern General	282	1,212	23.3%
London St. Joseph's	755	4,114	18.4%
London Victoria	317	2,096	15.1%
Strathroy Middlesex General	49	312	15.7%
Bracebridge Muskoka Memorial	49	226	21.7%
Huntsville District Memorial	56	263	21.3%
Fort Erie Douglas Memorial	46	222	20.7%
Grimsby West Lincoln Memorial	88	406	21.7%
Niagara Falls Greater Niagara General	142	865	16.4%
Port Colborne General	28	118	23.7%
Orillia Soldier's	227	883	25.7%
Penetanguishene General	29	120	24.2%
Alexandria General	0	17	0.0%
Cornwall Hotel Dieu	239	1,028	23.2%

Hospital	With Cesarean Section	Total Obstetric Cases	% of Cesarean
Winchester District Memorial	72	382	18.8%
Lindsay Ross Memorial	94	571	16.5%
Cambridge Memorial	290	1,349	21.5%
Kitchener-Waterloo	533	2,630	20.3%
Kitchener St. Mary's	325	1,612	20.2%
Fergus Groves Memorial	48	222	21.6%
Guelph General	267	1,621	16.5%
Mt. Forest Louise Marshall	7	90	7.8%
Palmerston and District	12	117	10.3%
Hamilton Henderson General	428	2,102	20.4%
Hamilton Chedoke	497	2,126	23.4%
Hamilton St. Joseph's	599	2,877	20.8%
Newmarket York County	340	1,960	17.3%
Richmond Hill York Central	323	1,502	21.5%
Elliot Lake St. Joseph's	70	309	22.7%
Sault Ste. Marie General	296	1,386	21.4%
Wawa Lady Dunn	10	73	13.7%
Cochrane Lady Minto	20	103	19.4%
Hearst Notre Dame	36	157	22.9%
Kapuskasing Sensenbrenner	61	214	28.5%
Matheson Bingham Memorial	0	25	0.0%
Moose Factory General	16	142	11.3%
Smooth Rock Falls	0	15	0.0%
Timmins St. Mary's	217	905	24.0%
Dryden District	41	189	21.7%
Kenora Lake Of Woods	42	362	11.6%
Atikokan General	0	42	0.0%
Fort Frances Rainy River	50	260	19.2%
Rainy River, Rainy River	0	13	0.0%
Sudbury General	511	2,234	22.9%
Chapleau General	0	32	0.0%
Geraldton District	0	64	0.0%
Manitouwadge General	0	47	0.0%
Marathon Wilson	0	64	0.0%
Terrace Bay McCausland	0	46	0.0%
Thunder Bay General Port Arthur	261	1,058	24.7%
Thunder Bay McKellar	256	980	26.1%
New Liskeard Temiskaming	48	266	18.0%
Kirkland Lake & District	38	236	16.1%
Sturgeon Falls W. Nipissing	0	75	0.0%
Mississauga Credit Valley	465	2,549	18.2%
Scarborough Salvation Army Grace	347	1,900	18.3%

Source: HMRI

Comparison of Selected Hospital Care Practices and Rates of Cesarean Birth

Appendix V

Cesarean birth rate cross-tabulated against whether there is a policy regarding how long a woman is permitted to remain in second-stage labour

	N	Y
<10%	19(18.3%)	1(3.4%)
10-15%	6(5.8%)	2(6.9%)
15-20%	33(31.7%)	10(34.5%)
20-25%	29(27.9%)	13(44.8%)
25-30%	17(16.3%)	3(10.3%)
Total	104(100%)	29(100%)

(14 hospitals did not respond to one or both of the above questions)

Cesarean birth rate cross-tabulated against whether an initial 30-minute FHR is electronically run

	All Women	Selected Women	No Women
<10%	8(10.7%)	3(9.7%)	4(25.0%)
10-15%	4(5.3%)	1(3.2%)	1(6.3%)
15-20%	26(34.7%)	10(32.3%)	5(31.3%)
20-25%	26(34.7%)	9(29.0%)	5(31.3%)
25-30%	11(14.7%)	8(25.8%)	1(6.3%)
Total	75(100%)	31(100%)	16(100%)

(25 hospitals did not respond to one or both of the above questions)

Cesarean birth rate cross-tabulated against whether the progression of labour is graphically recorded

	N	Y
<10%	12(18.8%)	8(11.9%)
10-15%	2(3.1%)	6(9.0%)
15-20%	22(34.4%)	20(29.9%)
20-25%	19(29.7%)	23(34.3%)
25-30%	9(14.1%)	10(14.9%)
Total	64(100%)	67(100%)

(16 hospitals did not respond to one or both of the above questions)

Cesarean birth rate cross-tabulated against whether there was a policy regarding mobility during labour

	N	Y
<10%	14(18.9%)	6(10.2%)
10-15%	3(4.1%)	5(8.5%)
15-20%	20(27.0%)	23(39.0%)
20-25%	23(31.1%)	19(32.2%)
25-30%	14(18.9%)	6(10.2%)
Total	74(100%)	59(100%)

(14 hospitals did not respond to one or both of the above questions)

Source: Maternal/Newborn Hospital Survey, 1990, Ministry of Health

Appendix VI

Table VI.1

Outcomes of Labour After Previous Cesarean Section
Summary of Data from Developed Nations 1985-1990
(English Language Literature Only)

Cited Ref.	# Labours After Cesarean	# VBAC	% VBAC	Dehiscence	Rupture	Hysterectomy
90	216	143	66.20%	1	0	0
121	463	276	59.61%		0	0
47	1,156	745	64.45%	4	1	1
155	98	58	59.18%	2	0	0
46	57	44	77.19%	1	0	0
116	1,781	1,618	90.85%		8	
161	272	216	79.41%	6	1	
a 134	919	760	82.70%	11	1	0
38	227	167	73.57%	0	1	0
53	1,776	1,314	73.99%	11	3	1
129	229	170	74.24%	3	0	0
a 143	393	232	59.03%	11	1	0
133	352	239	67.90%		0	0
b 58	15	15	100.00%	0	0	0
b 12	4	4	100.00%	0	0	0
a 119	420	297	70.71%	3	1	0
150	339	202	59.59%	0	0	0
122	848	779	91.86%	3	5	0
b 162	25	18	72.00%	1	0	0
179	224	137	61.16%	2	2	1
c 130	1,132	893	78.89%		1	1
147	237	196	82.70%	4	0	0
54	3,957	2,977	75.23%		6	1
44	73	59	80.82%	1	0	0
67	53	44	83.02%	0	0	0
112	506	395	78.06%	5	1	0
140	35	29	82.86%	0	0	0
167	66	62	93.94%	0	0	0
66	14	14	100.00%	0	0	0
65	40	32	80.00%	0	0	0
70	35	27	77.14%	1	0	0
148	1,200	977	81.42%		0	0
21	424	312	73.58%		5	0
				d	*d*	*d*
Totals	17,586	13,451	76.49%	70(0.4%)	37(0.2%)	5(0.03%)

Notes:
Two fetal deaths were reported.

a Fundal/classical rupture reported.
b Series reported are multiple births.
c Series of breech presentations.

d All % are calculated from only those studies that contain the relevant outcome e.g., studies not reporting the number of VBACs are excluded from the calculation.

Compiled by: Caroline Sufrin-Disler, VBAC/AVAC Canada

Table VI.2

VBAC After More Than One Previous Cesarean
1979 – 1990

Cited Ref.	# Labours After More Than One Cesarean[a]	# VBAC	% VBAC	# Labours After Two Cesareans[a]	# VBAC	Dehiscence	Rupture	Hysterectomy
53	89	68	76.40%	82	63	0	0	0
129	3					1	0	0
162	4			4		1	0	0
117	6	4	66.67%	5	4			
Chi		1			1	0	0	0
Saldana	38	22	57.89%		18	0	0	0
161	51	43	84.31%	44	36		0	0
Martin	19	12	63.16%	13	9	0	0	0
Wadhawan	31	22	70.97%	31	22		0	0
133	501	346	69.06%	501	346	9	0	0
134	8	7	87.50%				0	0
131	2	2	100.00%				0	0
b 126	36	29	80.56%	27	21	0	1	0
142	55	25	45.45%	51	23	3	0	0
46	57	44	77.19%	39		1	0	0
Porreco	21	17	80.95%	20		0	0	0
12	1	1	100.00%			0	0	0
Graham	3	2	66.67%	3	2	0	0	0
19	9	7	77.78%	9	7			
102	1	1	100.00%			0	0	0
140	1	1	100.00%	1	1	0	0	0
54	156	100	64.10%					
44	4	3	75.00%	4	3	0	0	0
112		25			20			
Gellman		2				0	0	0
70	35	27	77.14%	29	23	1	0	0
Totals	1,131	783	69.66%[c]	800	560(70%)[c]	16(1.84%)[c]	1(0.10%)[c]	0

Notes:

No fetal deaths reported in these studies.

a Differences between numbers in these columns are labours occurring after more than 2 previous cesareans.

b This uterine rupture in this report occurred in a woman with 2 previous classical incisions.

c All % are calculated from only those studies that contain the relevant outcome, e.g., studies not reporting the number of VBACs are excluded from the calculation.

Added References:

Chi, I., Saifuddin, A.B., Gunatilake, D.E. and Wallace, S.L. Deliveries after cesarean birth in two Asian university hospitals. *International Journal of Gynecology and Obstetrics.* (1983), 21: 11-16.

Saldana, L.R., Schulman, H. and Reuss, L. Management of pregnancy after cesarean section. *American Journal of Obstetrics and Gynecology.* (1979), 135(5): 556-561.

Martin, J.N., Harris, B.A., Huddleston, J.F., Morrison, J.C., Propst, M.G., Wiser, W.L., Perlis, H.W. and Davidson, J.T. Vaginal delivery following previous cesarean birth. *American Journal of Obstetrics and Gynecology.* (1983), 146(3): 255-263.

Wadhawan, S., Narone, J.N. Outcome of labor following previous cesarean section. *International Journal of Gynecology and Obstetrics.* (1983), 21: 7-10.

Porreco, R.P., Meier, P.R. Trial of labor in patients with multiple previous cesarean sections. *Journal of Reproductive Medicine.* (1983), 28(11): 770-772.

Graham, A.R. Trial labor following previous cesarean section. *American Journal of Obstetrics and Gynecology.* (1984), 149(1): 35-45.

Gellman, E., Goldstein, M.S., Kaplan, S. and Shapiro, W.J. Vaginal delivery after cesarean section – experience in private practice. *Journal of American Medical Association.* (1983), 249(21): 2935-2937.

Compiled by: Caroline Sulrin-Disler, VBAC/AMAC Canada

Table VI.3

Studies (1985 – 1990) Reporting on Oxytocin Use for Labour After Previous Cesarean

Cited Ref.	# Labours, no Oxytocin	# VBAC	% VBAC	Dehiscence	Rupture	Hysterectomy	# Labours, with Oxytocin	# VBAC	% VBAC	Dehiscence	Rupture	Hysterectomy
52	1,291	1,005	77.85%	6	1	1	485	309	63.71%	5	2	1
54	2,756	2,146	77.87%		3	1	1,201	831	69.19%		4	0
116	1,062	984	92.66%		2		719	634	88.18%		6	
121	386	220	56.99%	0	0	0	77	56	72.73%	0	0	0
166	30	17	56.67%	2	0	0	22	14	63.64%	1	0	0
161	139	116	83.45%	5	0	0	133	98	73.68%	1	1	0
156	541	373	68.95%	5	2	1	144	100	69.44%	3	2	2
140	27			0	0	0	2			0	0	0
167	49	47	95.92%	0	0	0	17	15	88.24%	0	0	0
67	48	40	83.33%	0	0	0	5	4	80.00%	0	0	0
155							98	58	59.18%	2	0	0
147	164	146	89.02%	1	0	0	73	50	68.49%	3	0	0
8		57		0	0	0	63	49	77.78%	0	0	0
143	259	182	70.27%	4	0	0	134	54	40.30%	7	0	0
122	602				6	0	406	n/a			0	0
46	52				0	0	5	n/a			0	0
58	10	10	100.00%	0	0	0	5	5	100.00%	0	0	0
162	18	12	66.67%	0	0	0	7	6	85.71%	1	0	0
99	35	26	74.29%		0	0	102	86	84.31%		0	0
65	32	28	87.50%	0	0	0	8	4	50.00%	0	0	0
				a	*a*	*a*				*a*	*a*	*a*
Totals	7,501	5,409		23(0.75%)	14(0.18%)	3(0.04%)	3,706	2,373		23(1.8%)	15(0.4%)	3(0.1%)
Labours with VBACs Reported	6,820	5,352	*a* 78.40%				3,293	2,373	*a* 72.06%			

Notes:

Two fetal deaths reported; one (Flamm, 1990) in a woman with 2 previous cesareans who laboured at home unattended and sustained a rupture.

a All % are calculated from only those studies that contain the relevant outcome; e.g., studies not reporting the number of VBACs are excluded from the calculation.

Compiled by: Caroline Sufrin-Disler, VBAC/AVAC Canada

Outcomes from Randomized Controlled Trials of External Cephalic Version

Appendix VII

From the Oxford Database of Perinatal Trials (Chalmers, I. ed.) Version 1.2, Disk Issue 4, August 1990

Editorial commentary

Overview 3087.

Hofmeyr GJ (editor). External cephalic version at term.

1 Objective: To assess the effects of external cephalic version for breech presentation at term on presentation at and method of delivery, and perinatal morbidity and mortality.

External cephalic version (ECV) at term differs in many fundamental ways from that performed before term, and should be evaluated as a separate procedure.

2 Criteria for considering trials for the overview: Trials included are those in which women with breech presentation suitable for external version were allocated by acceptably random method to a control group, or to one in which external version was attempted at term, or version attempts were systematically continued until term.

3 Trials excluded: None.

4 Trials included: Van Dorsten et al 1981 and Stine et al 1985; Hofmeyr 1983; Brocks et al 1984, and Van Veelen et al 1989.

Van Veelen et al (1989) enrolled women at varying gestational ages, from as early as 33 weeks. Their study is included because external version was systematically repeated when necessary up to term gestation. If anything, the greater opportunity for spontaneous version in the control group is likely to have underestimated the potential benefit of external version performed only at term.

5 Unpublished data: Nil.

6 Methodological quality: In all four of the trials participants were randomly allocated to a study or control group. The exclusion of 3 women after enrolment in the Van Dorsten et al (1981) study and the loss to follow-up of 1 woman in the study of Van Veelen et al (1989) are unlikely to have affected the results materially.

7 Results: The pooled data from these studies show a statistically significant and clinically meaningful reduction in the non-cephalic birth and cesarean section rates when ECV was attempted. There was no significant difference in the incidence of Apgar score ratings below 7 at 1 or 5 minutes, or perinatal death.

8 Consistency of results across trials: The absolute numbers of cephalic births and cesarean sections vary considerably. This probably reflects differences in study populations and cesarean section policies, respectively. The ratios of these outcomes between

study and control groups are, however, materially consistent.

9 Implications for current practice: The studies in this overview provide convincing evidence that the chance of breech birth and cesarean section may be substantially reduced by attempting ECV at term. There is thus sound reason for the clinical use of ECV at term, with appropriate precautions, in any case in which the value of the improved chance of cephalic birth outweighs the risk of the procedure.

10 Implications for research: Future research should be directed towards refining the selection of patients suitable for ECV attempt at term, and evaluating ECV during labour and in non-longitudinal lies.

11 Conclusions: Unlike external cephalic version before term, the policy of external cephalic version in selected women with breech presentation at term is associated with significant and meaningful reductions in the chance of breech delivery and cesarean section. While the procedure appears relatively safe, the numbers studied are insufficient to give a precise estimate of perinatal risks.

12 Additional references: Hofmeyr GJ, Breech presentation and abnormal lie in late pregnancy. In: Chalmers I, Enkin MW, Keirse MJNC (eds), *Effective Care in Pregnancy and Childbirth*. Oxford: Oxford University Press, 1989, pp. 653-665.

Effect of external cephalic version at term on non-cephalic births

Study	EXPT n	EXPT (%)	CTRL n	CTRL (%)	Odds Ratio (95% CI)
Van Veelen AJ et al. (1989)	39/89	(43.82)	67/90	(74.44)	0.28 (0.16-0.51)
Van Dorsten JP et al. (1981)	8/25	(32.00)	19/23	(82.61)	0.13 (0.04-0.41)
Hofmeyr GJ (1983)	1/30	(3.33)	20/30	(66.67)	0.06 (0.02-0.19)
Mahomed K et al. (1991)	18/103	(17.48)	87/105	(82.86)	0.07 (0.04-0.13)
Brocks V et al. (1984)	17/31	(54.84)	29/34	(85.29)	0.23 (0.08-0.68)
TYPICAL ODDS RATIO (95% Confidence interval)					**0.13** (0.10-0.19)

Graph of Odds Ratios & Confidence Intervals

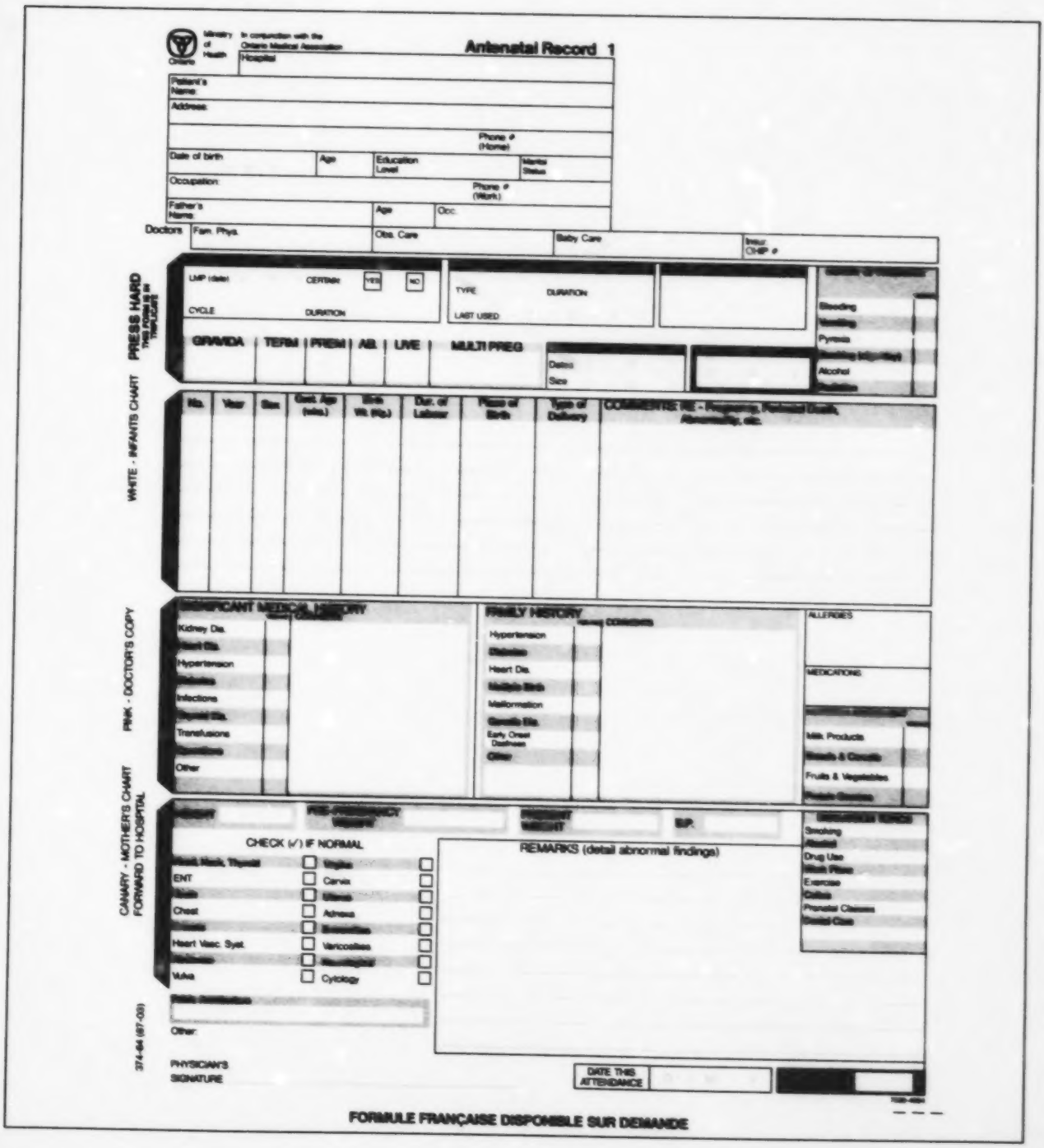
Effect of external cephalic version at term on cesarean section

Study	EXPT n	EXPT (%)	CTRL n	CTRL (%)	Odds Ratio (95% CI)
Van Veelen AJ et al. (1989)	8/89	(8.99)	13/90	(14.44)	0.59 (0.24-1.47)
Van Dorsten JP et al. (1981)	7/25	(28.00)	17/23	(73.91)	0.17 (0.05-0.51)
Hofmeyr GJ (1983)	6/30	(20.00)	13/30	(43.33)	0.35 (0.12-1.02)
Mahomed K et al. (1991)	13/103	(12.62)	35/105	(33.33)	0.31 (0.16-0.60)
Brocks V et al. (1984)	7/31	(22.58)	12/34	(35.29)	0.55 (0.19-1.58)
TYPICAL ODDS RATIO (95% Confidence interval)					**0.36** (0.24-0.54)

Graph of Odds Ratios & Confidence Intervals

Ontario Antenatal Record

Appendix VIII



Ministry of Health
Ontario

In conjuction with the Ontario Medical Association

Antenatal Record 2

Patient's Name

Address

Doctors

PRESS HARD
THIS FORM IS IN TRIPLICATE

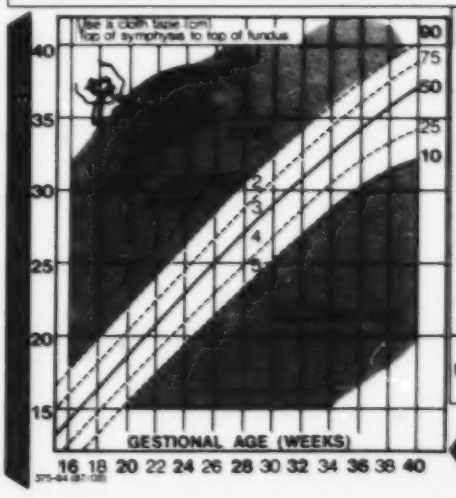
WHITE - INFANT'S CHART

PINK - DOCTOR'S COPY

CANARY - MOTHER'S CHART FORWARD TO HOSPITAL

DATE	WT. (lb./kg.)	CUM. WT. GAIN (lb./kg.)	G-JUICE MG.	S.F. HT.	PRESEN. POSN.	PH	URINE ALB.	URINE SUG.	URINE ACE.	BP	RBC GRADE	LAB	COMMENTS (Other lab. medications, etc.)

ADDITIONAL COMMENTS:



Measure symphysis-fundus height at each antenatal visit and record on graph opposite.

Ultrasound and Abnormal Laboratory Results

Dietician

Social Worker

ALLERGIES

MEDICATIONS

HBsAg

ALPHA FETO PROT

Nutrition	
Diet	
Rest	
Travel	
Prem. Labour	
Breast Care	
Anaes. Med.	
Type of Delivery	
Father at Delivery	
Breast Feeding	
Room-In	
Circumcision	
Early Discharge	
Car Safety	
Obstetrician	
Paediatrician	
Fetal Movement Counts	

PHYSICIAN'S SIGNATURE

FORMULE FRANÇAISE DISPONIBLE SUR DEMANDE

A GUIDE TO PREGNANCY RISK GRADING

At each antenatal visit please give your assessment of pregnancy (fetal plus maternal) risk according to the following grading system. The risk factors or problems listed below are intended *as examples only*. Additional space is provided for other risk producing problems which you have identified. This risk grading system is intended as a basis for planning the ongoing management of the pregnancy.

Pregnancy at no predictable risk

- ☐ NO PRIOR PERINATAL MORTALITY OR LOW BIRTHWEIGHT INFANT
- ☐ NO SIGNIFICANT MEDICAL DISEASE
- ☐ NO PREGNANCY COMPLICATIONS NOW OR IN THE PAST (Bleeding, Hypertension, Premature Labour)
- ☐ FETAL GROWTH SEEMS ADEQUATE

Pregnancy at risk

The fetus and/or mother may be at risk and consultation should be considered with a specialist obstetrician in your area. In addition, consultation with an appropriate internist may also be necessary. (These patients may be managed by continuing collaborative care and delivery in an obstetrical unit with intermediate level nursing facilities OR they may be returned to the care of the referring physician with a suggested plan of management for the remainder of the pregnancy).

- ☐ DIABETES, CLASS A (GESTATIONAL) OR CLASS B
- ☐ HYPERTENSION WITHOUT TOXAEMIA
- ☐ APH, CEASED AND IN HOSPITAL
- ☐ CERVICAL INCOMPETENCE
- ☐ HYDRAMNIOS
- ☐ POST - DATE PREGNANCY (42 weeks +)
- ☐ HISTORY OF PRIOR STILL BIRTH OR NEONATAL DEATH OR PREMATURE DELIVERY
- ☐ MATERNAL OBESITY (20% > IDEAL B.WT.)
- ☐ SIGNIFICANT TOBACCO, ALCOHOL, DRUG INTAKE
- ☐ RHESUS IMMUNIZATION
- ☐ PREMATURE RUPTURE OF MEMBRANES 34 WK. OR MORE
- ☐ OTHER SIGNIFICANT MEDICAL ILLNESS
- ☐ RENAL DISEASE WITHOUT HYPERTENSION
- ☐ MILD TOXAEMIA
- ☐ CONTROLLED PREMATURE LABOUR
- ☐ MULTIPLE PREGNANCY
- ☐ BREECH: BEYOND 36 WEEKS
- ☐ PRIMIGRAVIDA (age 35 +)
- ☐ HISTORY OF GENETIC DISEASE IN FAMILY (Genetic Amniocentesis or Counselling required)
- ☐ ANAEMIC NOT RESPONDING TO IRON (< 10gm)
- ☐ WEIGHT GAIN < 10 lbs. BY 30 WEEKS
- ☐ GRAND MULTIPARA (> 5)
- ☐ LARGE FOR DATES
- ☐ PREVIOUS UTERINE SURGERY INCLUDING CAESAREAN SECTION
- ☐ .....

Pregnancy at high risk

Pregnancies which are so complicated that the fetus and/or mother are obviously in danger. If at all possible, these patients should be transferred to a regional perinatal centre (level III) for intensive care and delivery. Clearly, there are patients who deserve to be placed in this risk category (with problems such as excessive antepartum bleeding , cord prolapse, or advanced uncontrolled premature labour) who cannot be transferred safely or in time to benefit the fetus or mother.

- ☐ DIABETES CLASS C, D, F, R OR SIGNIFICANTLY COMPLICATED
- ☐ RENAL DISEASE WITH HYPERTENSION ±↓FUNCTION
- ☐ PREMATURE RUPTURE OF MEMBRANES (± SEPSIS) *
- ☐ ANTEPARTUM BLEEDING, CONTINUING OR REPEATED *
- ☐ FETAL ANOMALY .....
- ☐ .....
- ☐ HYPERTENSION WITH SUPERIMPOSED TOXAEMIA
- ☐ EARLY UNCONTROLLED PREMATURE LABOUR *
- ☐ SEVERE FETAL GROWTH ARREST (< 10th Percentile)
- ☐ HEART DISEASE, ESPECIALLY WITH FAILURE
- ☐ OLIGO HYDRAMNIOS .....
- ☐ .....

* 24 - 34 weeks gestational age.

Two or more minor risk problems can combine to produce a high pregnancy risk. Such a patient may deserve to be placed in a higher risk category.

Guidelines for Induction of Labour

Appendix IX

Source: ***Journal of the Society of Obstetricians and Gynaecologists of Canada,*** **Volume 11, Number 7, December 1989**

A submission from the Maternal Fetal Medicine Committee of the SOGC

Definition

The initiation of uterine contractions by medical and/or surgical means for the purpose of effecting delivery of the infant.

General Comments

1. Induction of labour is recognized as having definite associated risks for both mother and fetus.
2. When induction is contemplated, it is important that the attending physician consider where the best conditions can be provided for labour, delivery, postpartum and neonatal care, and refer the patient if advisable.
3. The most widely used method of induction is the intravenous infusion of oxytocin.
4. Induction with oral prostaglandin carries with it a hazard equal to or greater than that of oxytocin.

Recommended Facilities for the Safe Induction of Labour

1. An adequately equipped labour/delivery area with oxygen and suction immediately at hand.
2. Appropriately trained nursing staff in the labour/delivery area available for 1:1 nursing.
3. Operating room facilities where cesarean section can be performed during induction.
4. Personnel available at short notice to staff the operating room during induction.
5. Continuous fetal heart rate monitoring.
6. A constant-infusion pump if oxytocin is the inducing agent.
7. Laboratory facilities and availability of blood for transfusion.

Indications

When maintenance of the well-being of the baby or mother makes delivery advisable or necessary, for example, as may occur in the following clinical circumstances:

1. Hypertensive disorders of pregnancy.
2. Rh alloimmunisation.
3. Premature rupture of membranes.
4. Diabetes mellitus.
5. Postmaturity: in selected cases when the gestation exceeds 42 weeks.
6. Intrauterine growth retardation.

7 Chorioamnionitis.

8 Abnormal findings on fetal surveillance, such as decreased fetal movement, oligohydramnios, abnormal heart rate pattern, or other indications of possible fetal compromise. Gestation-dependent.

Contraindications

A. Absolute

1 Transverse lie.

2 Absolute cephalo-pelvic disproportion.

3 Placenta praevia.

4 Presence of a uterine scar other than a single transverse low segment cesarean section scar.

5 Active genital herpes.

6 Invasive carcinoma of the cervix.

B. Relative

1 Grand multiparity ≥5.

2 Vertex not fixed in pelvis.

3 Unfavourable cervix.

4 Breech presentation.

5 Overdistension of uterus, e.g. polyhydramnios and multiple pregnancy.

Policy

1 It is recommended that a consultation be obtained, ideally with an obstetrician or, when such a specialist is not available, with another general practitioner. Before induction starts, the indication must be clearly documented on the patient's chart. The implications of induction should be explained to the patient.

2 In hospitals where immediate surgical and anaesthetic services are not constantly available, such personnel should be notified before starting the induction, and be kept advised of progress.

3 A qualified registered nurse, familiar with the effects of induction agents and able to detect both maternal and fetal complications, must be in attendance throughout the induction.

4 Once an induction is started, it should not be interrupted unless there is a valid medical reason.

5 An abdominal and pelvic examination should be carried out shortly before starting the induction.

6 The patient and the progress of the induction should be evaluated at least every 2 hours thereafter, and the findings recorded on the chart.

7 A physician must be immediately available by telephone during the induction and available to come promptly to the labour/delivery area if required.

8 Prior to induction, a 20-minute baseline monitor record should be made of uterine contractions and fetal heart rate.

9 Continuous monitoring of fetal heart rate and uterine contractions throughout the induction is desirable.

10 Regular observation of maternal pulse, blood pressure, uterine contractions (frequency, duration, quality) and fetal heart rate must be recorded every 15 minutes. The progress of labour, including cervical dilation and descent of the presenting part, should be charted on a partogram.

11 Patients should be given only clear fluids during the induction, and intake/output should be accurately recorded for each 60-minute period.

Procedure for Induction Using Intravenous Oxytocin

1 Oxytocin is administered intravenously, using a constant-infusion pump in accordance with an acceptable protocol such as is described below.

2 A detailed conversion table giving the equivalent in **milliunits per minutes of oxytocin** or drops per minute or other expressions of the volume or rate of infusion related to the specific equipment being used should be available in the labour/delivery unit during the induction. Acceptable medical and nursing practice recognizes only the dose given per unit time as terminology to describe the administration of any drug, including oxytocin.

3 An intravenous infusion of 500 ml Ringer's lactate (R/L) or normal saline (N/S), using an 18-gauge intracatheter, is started at a site that allows mobility of the patient's arm. The oxytocin should be delivered through a secondary IV connected to the main infusion line as close to the primary venipuncture site as possible.

4 Two and one-half (2.5) units of oxytocin are added to 500 ml IV solution (R/L or N/S) and the infusion is started at 1-2 milliunits (mU) per minute. Alternative concentrations of oxytocin, and volumes of dilutant fluid, particularly those compatible with locally available infusion pumps, are equally acceptable. It is the dose of oxytocin per unit time which is important, and not the fluid infused (although fluid overload must be avoided). The point about acceptable alternative concentrations applies also to parts 5(c) and 5(d).

5 If contractions have been initiated by the starting dose but are not yet as desired, wait 15 minutes, then:

a) If contractions are satisfactory, keep the dose constant.

b) If contractions are not satisfactory (i.e. irregular or poorly sustained) increase by 1-2 mU/min every 15-30 minutes.

c) If adequate contractions have not occurred once a rate of 10 mU/min has been reached, the concentration of the infusion may then be increased by adding 5 units oxytocin to 500 ml IV solution and, starting at 10 mU/min, the rate of administration is increased by 2-4 mU/min every 15-30 minutes, using the same criteria.

d) Once a rate of 20 mU/min has been reached, a solution of 10 units oxytocin in 500 ml is substituted and the starting

rate of 20 mU/min is increased by 2-4 mU/min every 15-30 minutes, using the same criteria.

e) It is unusual to require more than 10-20 mU/min to initiate good uterine activity and the usual maintenance dose is 7-10 mU/min.

f) If more than 20 mU/min of oxytocin is needed to achieve good contractions the situation should be carefully reassessed. However, there is no fixed upper limit of oxytocin dose since the only proper limit is the uterine response. If more than 20 milliunits/min of oxytocin is given, however, care must be taken to avoid water intoxication including use of electrolyte solutions such as Ringer's lactate, and use of concentrated oxytocin solutions to decrease the total volume infused.

6 Once labour is well established, consideration may be given to decreasing the rate of oxytocin infusion. However, the regular contraction pattern must be sustained.

7 If fetal heart rate abnormalities develop, the infusion must be discontinued immediately, the patient placed on her left side, and oxygen given by face mask. The attending physician should be notified immediately.

8 If tetanic contractions (5 or more in a 10-minute period or contractions lasting more than 90 seconds) are observed, the oxytocin infusion must be discontinued and the attending physician notified immediately.

9 Following delivery, an oxytocin infusion of 20 units in 500 ml R/L or N/S at 100-125 ml/hr should be continued for at least 3 hours to prevent uterine atony.

Surgical Induction of Labour

1 Amniotomy is almost always the primary method of surgical induction. **Oxytocin infusion is most likely to initiate effective uterine contractions after amniotomy.**

2 It is most likely to be effective when:

a) The cervix is favourable.

b) The vertex is the presenting part and is well applied to the cervix.

3 Attendant risks:

a) Prolapse of the cord, if the presenting part is high and not well applied to the cervix.

b) Abrupt reduction of uterine volume by escape of large amounts of fluid may predispose to premature separation of the placenta.

c) Commits the patient to certain delivery, so that should induction fail, cesarean section is necessary.

d) In known instances of polyhydramnios, both a) and b) are increased.

The use of locally applied vaginal and cervical prostaglandin gels to ripen the cervix and facilitate induction of labour will be covered in a future article.

dozen randomized trials have compared the effect of PGE2 in some form of carrier gel, suppository or tablet, applied to the posterior vaginal fornix, in doses of 1 to 5 mg[1]. The largest experience, however, is with 0.5 mg of PGE2 in 2.5 ml of triacetin gel inserted with a small catheter into the cervical canal. Over 1,400 women have been studied in randomized trials[2-5]; 442 of these in Canadian studies[3,5].

The commonest findings from all of these studies are that over 50% of patients are induced by PGE2 gel whether applied intravaginally or into the cervical canal. Furthermore, in those patients whose labour is not induced by PGE2 gel, there is marked increase in the subsequent effectiveness of oxytocin induction, without evidence of adverse effects on infant outcome as measured by Apgar scores and neonatal morbidity. Three trials[6-8] report significant reduction in patients who remain undelivered 12 hours after induction. The Canadian trial, however, showed no statistical difference in the induction delivery interval between the PGE2 treated group and the placebo treated group; the mean time being 10.2 and 11.6 hours respectively.

Although the overall cesarean section rate for patients receiving PGE2 appears to be slightly lower than patients receiving placebo, this reduction is not statistically significant[1]. In the Canadian study, 27.6% were delivered by cesarean section in the PGE2 gel treated patients compared to 33.5% in the placebo group. Furthermore, there seems to be a general trend, from all the studies reported, of an increased need for cesarean section during the ripening period; 7% compared to 1.3% in the placebo group[1]. The increased need for cesarean section during this period, however, appears to be offset by a reduction in the need for cesarean section in labour. The clinical importance of this observation is that the ripening period is a time of increased risk and therefore requires appropriate careful supervision.

Table

Bishop's "pelvic score" for assessment of cervical ripeness[9]

Criteria	Number of marks awarded			
	0	1	2	3
Cervical dilatation (cm)	0	1-2	3-4	5-6
Cervical effacement (%)	0-30	40-50	60-70	≥80
Cervical consistency	firm	medium	soft	
Cervical position	posterior	central	anterior	
Station (in relation to the spines)	3 cm above	2 cm above	1-0 cm above	1-2 cm below

Other Methods?

Although oral administration of PGE2 tablets is capable of inducing labour, the evidence from a small number of randomized trials in which oral administration is compared to placebo, or conservative management, shows that this is not a particularly effective way to ripen the cervix[1]. Furthermore, as it has to be repeated frequently and over several hours, and gastrointestinal disturbances are relatively common, it is probably not a suitable preparation for ripening the unfavourable cervix.

Laminaria tents and foley catheters are still used prior to induction of labour when the cervix is unfavourable. Trials comparing such devices against prostaglandins suggest that they are less effective than PGE2 in both favourably changing the cervix and inducing labour[1].

Conclusions

In order to obtain the best effect from the lowest dose of PGE, it should be applied in gel to the cervical canal. A preparation about to be introduced (Prepidil-Gel, Upjohn Co.) contains 0.5 mg of PGE2 in 2.5 ml of triacetin gel and is designed for intracervical application. Unlike the gels currently prepared by Hospital Pharmacies, this preparation is stable and standardized. It should, therefore, supersede all "home-made" gels. When used intravaginally, the optimal dose of PGE2 is 3 mg. This is equivalent to 15 ml of the endocervical preparation; a volume that would not be retained in the vagina.

Eligible Patients

Prior to ripening, the following criteria should be met:

1. There should be good medical indication to induce labour.
2. The Bishop score should be 5 or less.
3. Gravida 1 or 2.
4. No previous uterine surgery.
5. No administration of any oxytocic agent (either previous application of PGE2 gel or oxytocin) within the previous six hours.
6. No contraindication to vaginal delivery.

(Asthma is not considered a contraindication.)

Prior to Gel Insertion

The patient should be on the labour floor and the fetal heart rate monitored for 30 minutes prior to insertion of the gel. Gel should not be inserted if there is any evidence of fetal distress. It is not necessary to establish an intravenous infusion.

Gel Insertion

The gel is inserted under direct vision using a vaginal speculum. The catheter, which is attached to a preloaded syringe, is gently inserted into the cervical canal until the membranes are encountered at which point the

Guidelines for the Use of Cervical and Vaginal Prostaglandins in the Induction of Labour

Appendix X

Source: ***Journal of the Society of Obstetricians and Gynaecologists of Canada,*** **Volume 12, Number 4, May 1990**

D.J.S. Hunter, MB, FRCS(C)
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Department of Obstetrics and Gynaecology
McMaster University

A submission from the Maternal Fetal Medicine Committee of the SOGC

Few things are more demoralizing for a pregnant patient and her attendants than a prolonged labour, culminating in cesarean section. As this happens in over 30% of patients who are induced when the cervix is unfavourable, the problem is a clinical condition worthy of serious attention.

Why Prostaglandins?

The duration of induced labour and the need for cesarean section is related to the state of the cervix prior to induction; conventionally described by the Bishop score (see Table). The resistance of an unfavourable cervix (a cervix with a low Bishop score) is not overcome by uterine contractions alone, exemplified by the ineffectiveness of oxytocin-induced contractions to change the cervix even after prolonged repeated administration. Observations in the late 1960s and early 1970s that the uterotonic prostaglandins E2 and F2α produce marked softening of the cervix in doses that are insufficient to cause uterine contractions led to the idea that these compounds might be able to change the cervix favourably prior to initiating formal induction of labour. Although no clinically important differences have been found between these two prostaglandins, E2 proved to be ten times more uterotonic than F2α. Consequently, as much smaller doses of PGE2 can be used with less chance of systemic side effects, the majority of clinical trials involving prostaglandins to ripen the cervix use PGE2.

Randomized Trials

During the last decade, over a

catheter is withdrawn 1/2 cm, and the gel gently injected into the cervical canal.

After Gel Insertion

The fetal heart rate should be monitored for one hour after gel insertion. Providing the fetal heart is normal and labour has not started, the patient is returned to the obstetrical ward.

Fetal monitoring should be restarted as soon as labour begins.

Oxytocin to induce labour should not be started for six hours after insertion of the gel. However, it should be used as clinically indicated to augment labour. Hypertonus can be treated if necessary by swabbing out the vagina with a saline-soaked swab and administering intravenous Ritodrine.

Other Considerations

The use of this preparation in patients with previous cesarean section or with spontaneous rupture of the membranes, or to induce a breech, has not been evaluated in appropriately conducted trials. Firm recommendations for its use in these situations, therefore, cannot be made at the present time. Likewise, repeated applications of gel when a single application fails to either induce labour or ripen the cervix have not been fully investigated. There are, however, no contraindications to repeated attempts to ripen the cervix provided that the applications do not occur more frequently than at six-hour intervals, and careful monitoring of the fetus as described above is carried out with each ripening attempt.

In most studies, the gel is inserted in the late evening. As over 50% of patients labour and approximately 40% deliver within 12 hours of receiving the gel, the appropriateness of evening administration might be questioned. Clearly, each department will need to assess the best time for gel insertion in the context of its own resources.

Summary

The greatest experience in the context of randomized trials with PGE2 gel to ripen the unfavourable cervix has been gained with 0.5 mg of PGE2 in 2.5 ml of Triacetin gel. This preparation (PrepidilGel, Upjohn Co.) is commercially available and is stable. Its availability will obviate the need for "homemade" preparations from Hospital Pharmacies. Unfortunately, there seems to be only a small reduction in the high cesarean section rate in these patients, with a small but significant increase in the need for cesarean section during the ripening period. The implications, therefore, are:

1 that patients still have to be carefully selected for induction of labour when the cervix is unfavourable, even if gel is to be used, and

2 that careful supervision needs to extend into the ripening period and not be confined to the period of labour induction. Any liberalization of induction of labour in patients with an unfavourable cervix as a result of the availability of prostaglandin gel will cause a significant increase in the number of patients undergoing unnecessary obstetrical intervention, including cesarean section.

References

1. Keirse MJNC, Oppen ACC. Preparing the cervix for induction of labour. *Effective Care in Pregnancy and Childbirth*. Vol. 2, 988-1056, 1989.
2. Noah ML, De Coster JM, Fraser TJ, Orr JD. Preinduction cervical softening with endocervical PGE2 gel. *Acta Obstet Gynecol Scand* 1987; 66:3-7.
3. Bernstein EP, Gauthier RJ, King JF, Hunter DJS, Jasmin Y, Manning FA et al. Prostaglandin E2 gel for cervical ripening and labour induction: a Canadian multi-centre placebo controlled trial. Unpublished Data: submitted for publication. 1989.
4. Cabrol D, Bernard N, Chouraqui A, Domenichi Y, Lemaire P, Lopes P, et al. Maturation du col uterin à terme par application unique d'un gel de prostaglandine E2 intracervical. *J Gynecol Obstet Biol Reprod* (in press), 1989.
5. Nimrod C, Currie J, Yee J, Dodd G, Persaud D. Cervical ripening and labor induction with intracervical triacetin base prostaglandin E2 gel: a placebo-controlled study. *Obstet Gynecol* 1984; 64:476-480.
6. Wingerup L, Andersson KE, Ulmsten U. Ripening of the uterine cervix and induction of labour at term with prostaglandin E2 in viscous gel. *Acta Obstet Gynecol Scand* 1978; 57:403-406.
7. Keirse MJNC, Kanhai HHH, Verwey RA, Bennebroek Gravenhorst J. European multi-centre trial of intracervical PGE2 in triacetin gel: report on the Leiden data. In: *The role of prostaglandins in labour*. Wood C (ed). London: Roy Soc Med Services Limited 1985; 93-100.
8. Bung P, Baer S, Djahanschah D, Huch R, Huch A, Huber JF, Estermann P, Beguin F, Delaloye F, Germond M, Bossart H, De Grandi P, Pfister A, Ehrsam A, Haller U. Multizentrische Erfahrungen bei intrazervikaler Applikation eines neuen PGE2 gels bei Geburtseinleitung. *Geburtshilfe Frauenheilkd* 1986, 46:93-97.
9. Bishop EH. Pelvic scoring for elective induction. *Obstet Gynecol* 1964; 24:266-268.

Labour Partograms

Appendix XI

Cervicograph

Figure XI.1 is the cervicograph published by Philpott and Castle in 1972. It was intended for use for primigravid women with cervical dilatation of 3 cm. or more at admission to hospital. The Alert Line joins points representing 1 cm. dilatation at zero time, i.e. admission, and full dilatation (10 cm.) nine hours later, a rate of 1 cm. per hour.

The Alert Line is intended to be simple and efficient; to separate the highest proportion of normal from abnormal labours, permitting time for transport to a central facility for those who need specialist care.

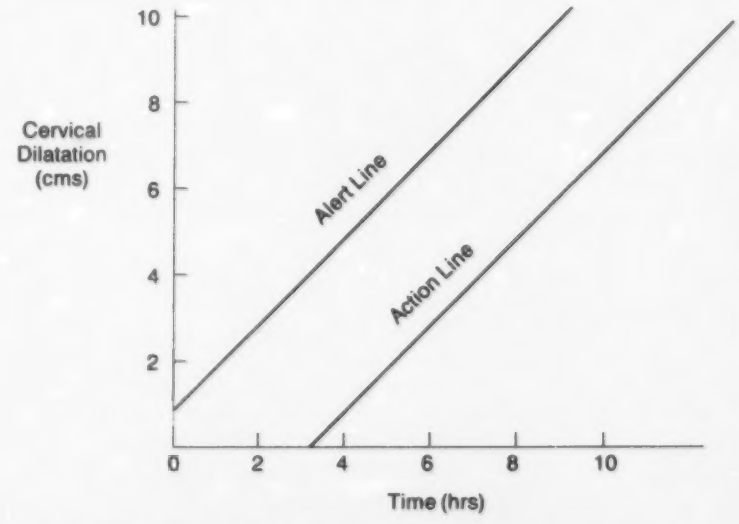
WHO Partograph

Figure XI.2 (p. 65) shows the partograph advocated by the World Health Organization. This partograph like others is basically a graphic representation of the events of labour plotted against time in hours. It consists of three components:

- the fetal record
- the record of the progress of labour
- the maternal record

It can be used for all labours in hospital. In the periphery, it would only be used for low-risk labours where spontaneous vaginal delivery is anticipated. High-risk

Figure XI.I



Source: Philpott, R.H. and Castle, W.M. Cervicographs in the Management of Labour in Primigravidae, *The Journal of Obstetrics and Gynaecology of the British Commonwealth*. (1972), 79: 592-598.

Figure XI.2

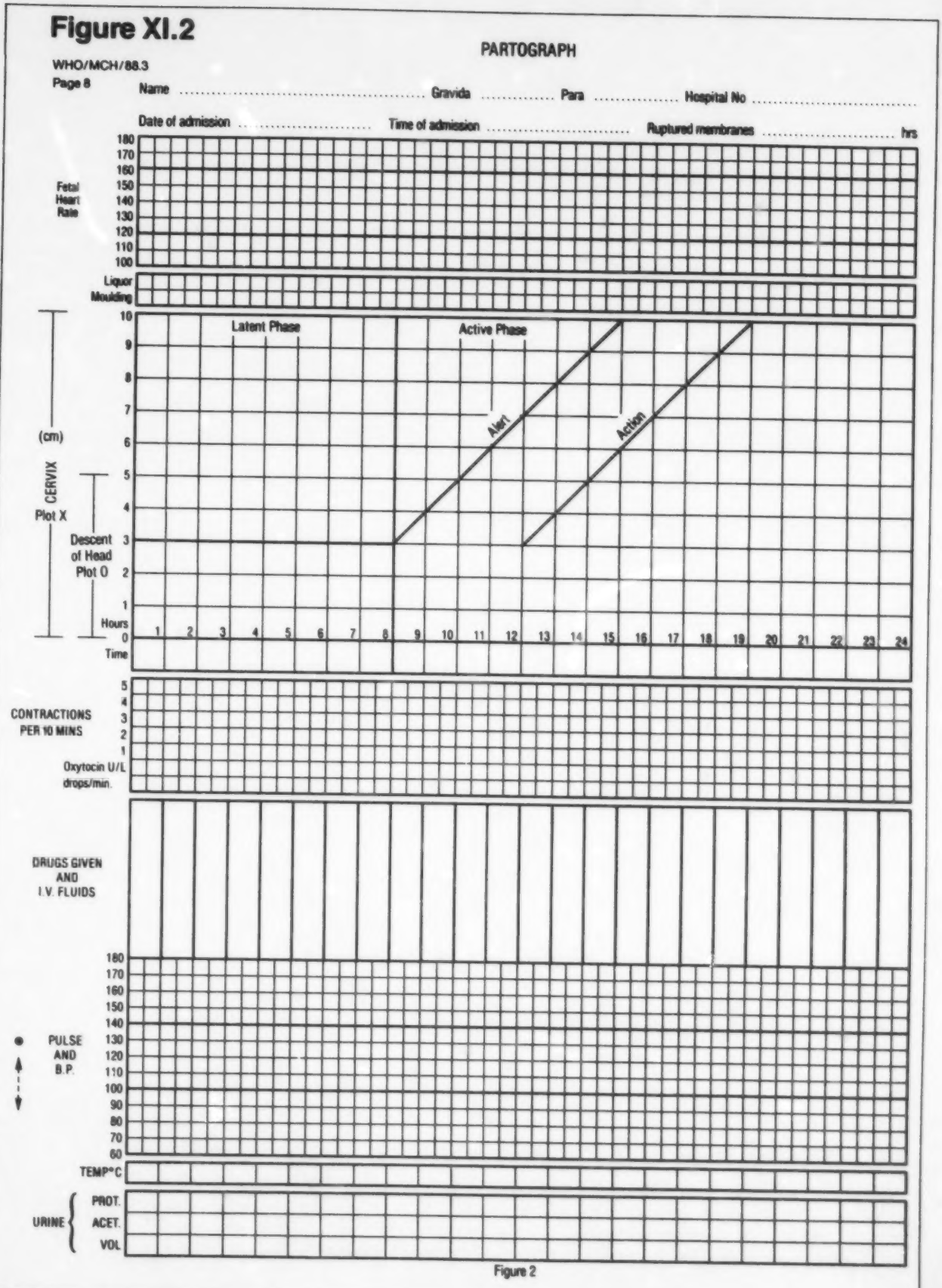


Figure 2

patients should be transferred to hospital immediately. The partograph does not replace adequate screening of women on arrival in labour to exclude conditions that require urgent attention or immediate transfer. It is designed to detect deviations from normal which develop as labour progresses.

The Record of the Progress of Labour

This part of the graph has as its central feature a graph of cervical dilation against time. It is divided into a latent phase and an active phase.

The Latent Phase

The latent phase of labour is from the onset of labour until the cervix reaches 3 cm dilation. If this phase is delayed for longer than 8 hours in the presence of at least 2 contractions in ten minutes, the labour is more likely to be problematical and therefore, if the woman is in a peripheral unit she should be transferred to hospital. If she is in hospital she needs critical assessment and a decision about subsequent management.

The Active Phase

1 Once 3 cm dilatation is reached, labour enters the active phase.

2 In about 90% of primigravidae the cervix dilates at a cm/hr or faster in the active phase.

3 The **'alert line'** drawn from 3 cm to 10 cm represents this rate of dilatation.

Therefore, if cervical dilatation moves to the right of the alert line it is slow and an indication of delay in labour. If the woman is in a peripheral unit she should be transferred to hospital; if in hospital she should be observed more frequently.

4 The **'action line'** is drawn four hours to the right of the alert line. It is suggested that if cervical dilatation crosses this line that there should be a critical assessment of the cause of delay and a decision about the appropriate management to overcome this delay.

This partograph is designed for use in all maternity settings but has a different level of function at different levels of health care. In a peripheral centre, the critical function is to give early warning that labour is likely to be prolonged and that the woman should be transferred to hospital (alert line function). In the hospital setting, moving to the right of the alert line serves as a warning for extra vigilance but the action line is the critical point at which specific management decisions must be made.

Other observations on the progress of labour are also recorded on the partograph and are essential features in the management of labour.

In particular, it is important to note other features relevant to the progress of labour, i.e. the **descent of the fetal head** through the pelvis and the **quality of uterine activity**.

The **fetus** is monitored closely on the partograph by regular observation of the fetal heart and of the liquor.

Regular assessment of the **maternal condition** is achieved by charting maternal temperature, pulse and blood pressure and by regular urinalysis. The partograph also contains a space to chart administration of oxytocin if labour is augmented.

The charting of all these features is described in detail in Section II of the document on the Partograph: The Users Manual (WHO/MCH/88.4).

Source: *The Partograph, A Managerial Tool for the Prevention of Prolonged Labour, Section I, The Principle and Strategy,* The World Health Organization Maternal and Child Health Unit, 1988.

Audit Forms for Use by Hospitals in Assessing Cesarean Birth

Appendix XII

This cesarean section audit system was developed to produce a complete and continuing screening system to detect unusual variations among hospitals with respect to cesarean section rates. As well, an ongoing screening process would enable the detection of trends in these rates. Just as importantly, regular and constructive feedback to hospitals, which could be provided by a continuing screening system, would be expected to strengthen their commitment to an internal program to monitor their cesarean section rates.

Cesarean section audit system: overview

Information Flow

The flow of information in this Cesarean Section Audit System is circular. Each hospital is provided with a system to produce i) a summary report (see Sample Hospital Audit Report), which is for the hospital's use, and ii) a file of hospital summary data, which is forwarded to a central body. (The central body would be a group or committee of people with expertise in appropriate disciplines, including statistics.)

The **hospital summary report** is an important component in each hospital's **internal** monitoring program; it describes the experience of the hospital with respect to a variety of measures relevant to the assessment of cesarean section rates. As well, as a set of appendices to this report, the experience of the individual physicians performing deliveries at the hospital is compared with the experience of the hospital as a whole (refer to p. 69). These individual comparisons facilitate appropriate interpretation (they are based on 95% confidence intervals) and they permit the detection of significant deviations in an individual's practice which would often be masked in the hospital summary. These deviations are best detected and interpreted at the hospital level where obvious explanations for these deviations are often apparent.

The **central body**, using the summary data provided by each hospital, produces **provincial and regional summary reports**, as well as summary reports for each level of hospital. The format of these reports is very similar to that of the hospital summary report but excludes individual physician data. This set of summary reports is then complemented by graphical comparisons of individual hospitals with respect to several important summary variables (see C/S Rates by Hospital Level). These hospital comparisons are made for each region and for each hospital level.

With this complementary set of reports, differences can be detected among entire regions and/or hospital levels, as well as among individual hospitals of a given region and/or level. Clearly, many differences will be observed for which explanations are readily apparent; for example, because many high-risk pregnancies are referred antenatally to Level III hospitals, one would expect to find slightly higher cesarean section rates in these hospitals compared to Level I hospitals. Other observed variations will not have obvious explanations; in these cases, a further, detailed investiga-

tion will be required to determine the meaning and significance of the observation. Thus, knowledgeable interpretation of these reports is very important.

Finally, a special **graphical report is prepared for each hospital by the central body**. The format of this report is similar to that of the individual physician comparisons. In this report, that particular hospital is compared with the province as a whole, all hospitals in its region, and all hospitals of its level. These comparisons are made with respect to several important summary variables. This report complements the original hospital summary report because it provides each hospital with a basis for comparison. Each hospital is able to examine its own experience and compare this with the experience of the province, its own region and its own level.

Implementation of the Audit System

In this Cesarean Section Audit System, experienced interpretation of results is important at both the individual hospitals and the central body. It must be remembered that this is a screening process, and thus its purpose can only be to detect unusual variations. Certainly, to detect a variation is not to explain it. **Necessary companions to this audit system** include a means to investigate the basis for observed variations and ultimately assess their meaning and significance as well as an approach to modification of factors responsible for inappropriately high rates.

With the implementation of a screening system such as the Cesarean Section Audit System, each hospital will have the ability to produce a detailed summary of its own experience with respect to cesarean sections, as well as to detect unusual variations in the practice of individual physicians. As well, regular feedback from the central body will provide each hospital with current information from a variety of perspectives.

For this screening system, each hospital will be provided with the necessary computer programs and data collection forms (see Required Computer Programs, Sample Hospital Data Collection Form and Sample Physician Data Collection Form), which will vary depending on factors such as whether or not the hospital maintains a computerized delivery log. As well as minimizing the inconvenience to each hospital, this will ensure that the information from each hospital will be consistent in type and, as much as possible, source. This consistency is vital for meaningful comparisons among hospitals and valid aggregation of results from several hospitals.

Summary

In summary, the implementation of a screening system such as this Cesarean Section Audit System would provide a broad spectrum of relevant information, contributing to a favorable environment for positive change in cesarean section rates.

Cesarean Section Audit System

OBJECTIVE:

- to serve as a screening process for the detection of unusual variations among hospitals with respect to cesarean sections

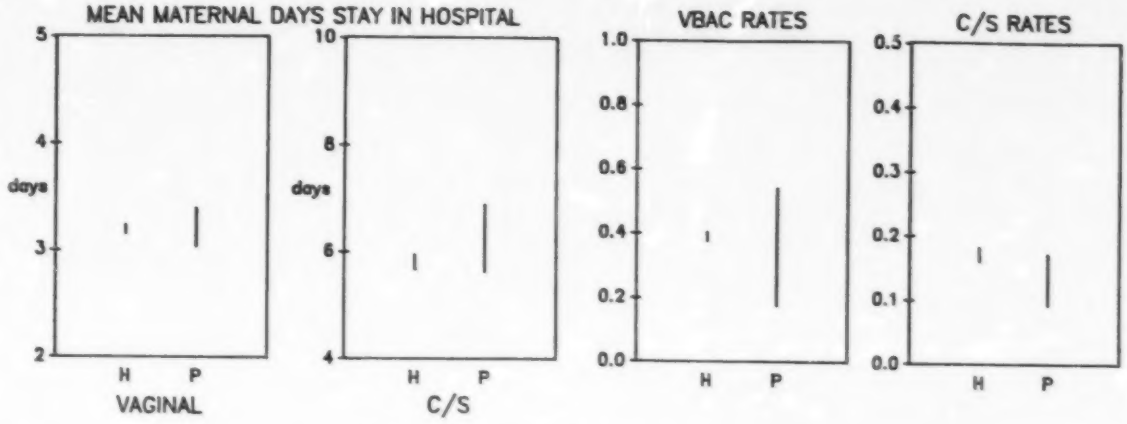
THIS SYSTEM CANNOT:

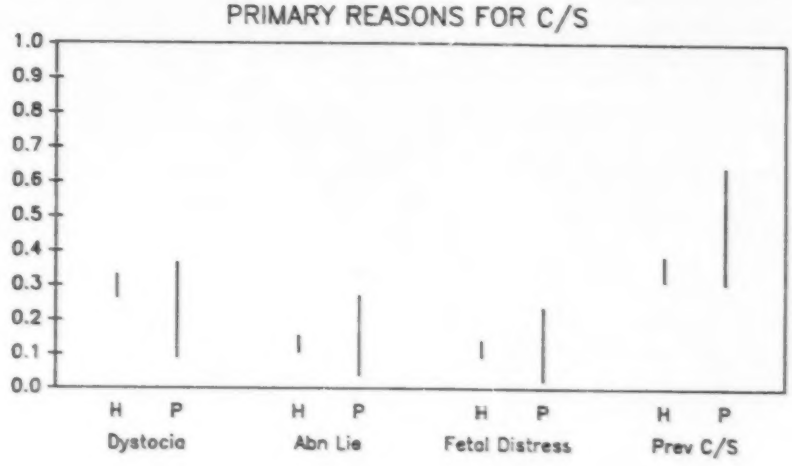
- explain observed differences between hospitals

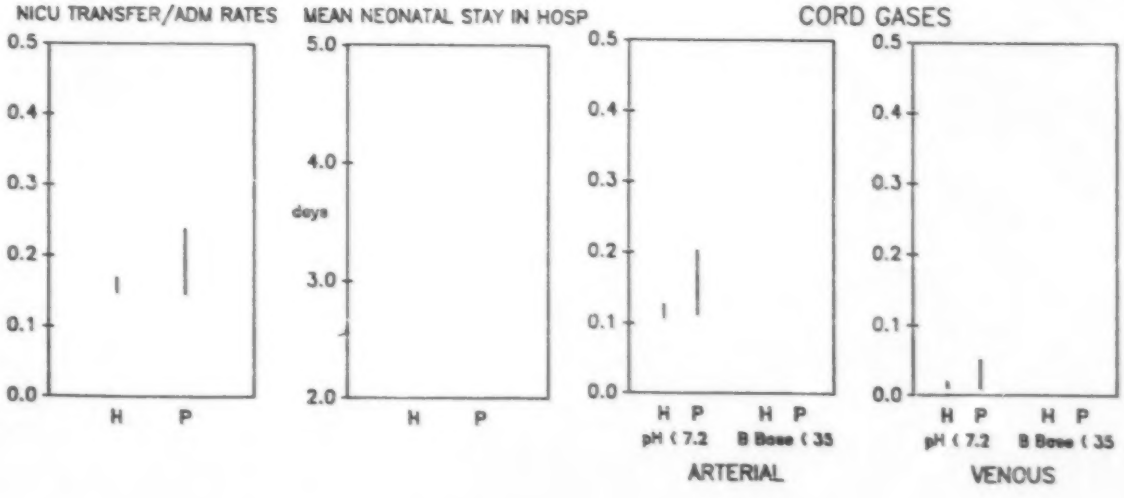
THIS SYSTEM ENABLES:

- each hospital to produce an annual summary report for their internal monitoring program
- each hospital to compare the experience of individual physicians with that of the hospital as a whole
- the production of summary reports for the province, each region and each hospital level
- the production of graphical comparisons among hospitals for each region and hospital level for important summary variables
- the production of a report for each hospital comparing their experience with that of their region, their level and the province

Example of Physician Performance Compared to Hospital







Sample Hospital Audit Report

GENERAL INFORMATION:

	#	%
All Deliveries	4208	
Vaginal	3491	83.0
C-Section	717	17.0
With Labour	451	10.7
Without Labour	266	6.3

	#	%
All Births	4315	
Vaginal	3562	82.5
Spontaneous	2473	57.3
Instrumental	1089	25.2
C-Section	753	17.5

Number of twins 99
Number of triplets 4
Number of multiple births ≥ 4 0
Number of births < 500 gm ..... 3 (Not included in statistics reported)

MATERNAL AGE DISTRIBUTION:

	< 20		20 – 24		25 – 29		30 – 34		≥ 35	
	#	%	#	%	#	%	#	%	#	%
All Gravida	245	5.7	740	17.1	1763	40.9	1163	27.0	404	9.4
Primiparous	220	11.6	477	25.1	812	42.7	325	17.1	68	3.6
Multiparous	25	1.0	263	10.9	950	39.4	837	34.7	335	13.9

MATERNAL MORBIDITY:
Mean days stay in hospital – vaginal deliveries ..... 3.2 days
Mean days stay in hospital – C/S deliveries ..... 5.8 days

VBACS:

	All		1 prev C/S	> 1 prev C/S
Deliveries with prev C/S	413			
C/S – w/o Labour	177	(42.9 %)		
Labour Trial	236	(57.1 %)		
Vaginal	164	(69.5 %)		
C/S w Labour	72	(30.5 %)		

PRIMARY C/S REASONS:

REASON	ALL		WITH LABOUR		WITHOUT LABOUR	
Dystocia	209	(29.1 %)	209	(46.3 %)		
Bleeding	25	(3.5 %)	9	(2.0 %)	16	(6.0 %)
Multiple Births	14	(2.0 %)	7	(1.6 %)	7	(2.6 %)
Breech	77	(10.7 %)	57	(12.6 %)	20	(7.5 %)
Fet Distr – Abs	73	(10.2 %)	54	(12.0 %)	19	(7.1 %)
Fet Distr – Rel	86	(12.0 %)	64	(14.2 %)	22	(8.3 %)
Abnormal Lie	13	(1.8 %)	11	(2.4 %)	2	(0.8 %)
Previous C/S	248	(34.6 %)	71	(15.7 %)	177	(66.5 %)

FETAL CONDITION:

Condition	ALL		VAGINAL		C/S	
	#	%	#	%	#	%
livebirths	4282	99.2	3460	99.2	749	99.5
transf/admit NICU	675	15.8	438	12.7	228	30.4
stillbirths	33	0.8	27	0.8	4	0.5
nn deaths	33	0.8	21	0.6	11	1.5

Mean days stay among survivors not transferred to an NICU: 2.4 days

APGAR SCORES:

	1 MINUTE						5 MINUTE					
	ALL		VAGINAL		C/S		ALL		VAGINAL		C/S	
SCORE	#	%	#	%	#	%	#	%	#	%	#	%
0 – 3	202	4.7	125	3.6	71	9.5	53	1.2	36	1.0	14	1.9
4 – 6	411	9.5	296	8.5	109	14.5	63	1.5	42	1.2	19	2.5
7 – 10	3693	85.8	3059	87.9	571	76.0	4191	97.3	3403	97.8	718	95.6

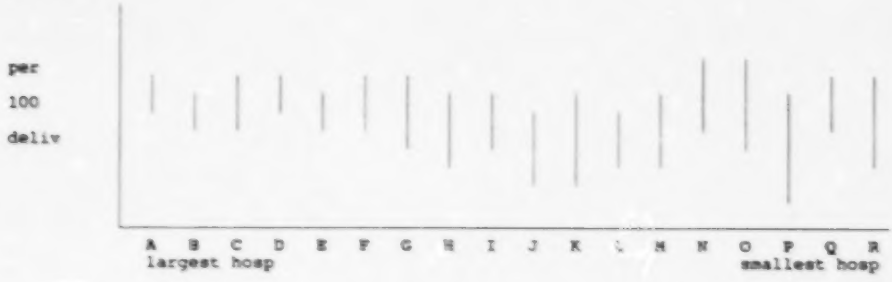
CORD GASES:

CONDITION	ARTERIAL pH < 7.2 #	%	VENOUS pH < 7.2 #	%
livebirths	440	11.5	56	1.4
transf/admit NICU	108	19.4	36	6.1
stillbirths	0	0.0	2	100.0
nn deaths	5	23.8	4	16.0

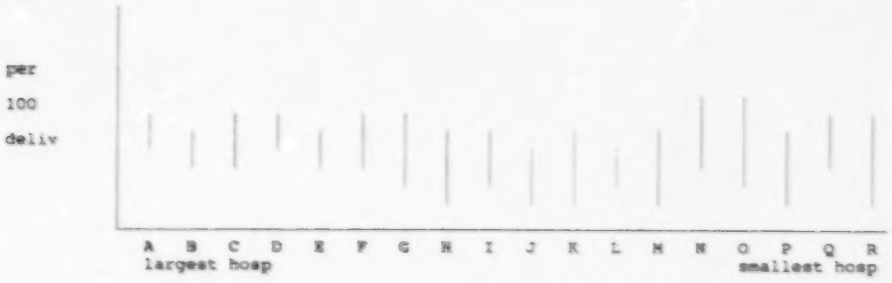
CONDITION	ARTERIAL BUFF BASE < 35 #	%	VENOUS BUFF BASE < 35 #	%
livebirths				
transf/admit NICU				
stillbirths				
nn deaths				

C/S RATES BY HOSPITAL LEVEL:

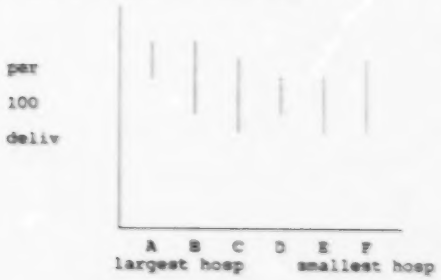
LEVEL I:



LEVEL II:



LEVEL MODIFIED III AND III:



REQUIRED COMPUTER PROGRAMS

Non-Computerized Hospitals	Computerized Hospital
A1	A2
B	
C	C
D	D
E	E
F1	F2

PROGRAM FUNCTION:

A1 – prompts user to enter hospital summary variables
(see SAMPLE HOSPITAL DATA COLLECTION FORM)

B – allows user to correct any data entry errors

A2 – computes hospital summary variables from database

C – computes rates and proportions from summary variables,
then produces summary report

D – allows user to update list of physician names for appendices
(see SAMPLE PHYSICIAN DATA COLLECTION FORM)

E – computes confidence interval limits for hospital summary variables,
used in appendices

F1 – prompts user to enter physician summary variables,
computes confidence limits for each physician for appendices,
produces a data file for each appendix,
then produces a hospital summary data file to be sent to central body

F2 – computes physician summary variables from database,
computes confidence limits for each physician for appendices,
produces a data file for each appendix,
then produces a hospital summary data file to be sent to central body

SAMPLE HOSPITAL DATA COLLECTION FORM

GENERAL INFORMATION:

Total Deliveries: _____
- # Vaginal: _____
- # C-Section: _____
  - # With Labour: _____
  - # Without Labour: _____

Total Births: _____
- # Vaginal: _____
  - # Spontaneous: _____
  - # Instrumental: _____
- # C-Section: _____

*Sets of: Twins _____ Triplets _____ Mult Births ≥ 4 _____

Births < 500 gm: _____ (DO NOT INCLUDE THESE BIRTHS IN ANY OTHER STATISTICS REPORTED)

MATERNAL INFORMATION:	TOTAL	PRIMIPAROUS	MULTIPAROUS
Total	_____	_____	_____
# aged < 20	_____	_____	_____
# aged 20-24	_____	_____	_____
# aged 25-29	_____	_____	_____
# aged 30-34	_____	_____	_____
# aged ≥ 35	_____	_____	_____

Vag Deliv with Known Length Hosp Stay: _____ Mean Days Stay: _____ Variance: _____
C/S Deliv with Known Length Hosp Stay: _____ Mean Days Stay: _____ Variance: _____

VBACS:	WITH ANY PREV C/S	WITH 1 PREV C/S	WITH > 1 PREV C/S
# Deliveries	_____	_____	_____
# C/S – No Labour	_____	_____	_____
# C/S – With Labour	_____	_____	_____
# Vag Deliv	_____	_____	_____

SAMPLE HOSPITAL DATA COLLECTION FORM (Continued)

PRIMARY REASONS FOR C/S:

# With Primary Reason Of:	TOTAL C/S	C/S WITH LABOUR	C/S WITHOUT LABOUR
Dystocia			
Bleeding			
Multiple Birth			
Breech			
Absolute Fetal Distress			
Relative Fetal Distress			
Abnormal Lie			
Previous C/S			

FETAL CONDITION:	TOTAL	VAGINAL BIRTHS	C/S BIRTHS
# Livebirths			
# Births Transf and/or adm NICU			
# Stillbirths			
# Neonatal Deaths			

Survivors (not transf or adm to NICU) with Known Length Hosp Stay: _____

Mean Days Stay: _____

Variance: _____

	1 MINUTE APGAR SCORES			5 MINUTE APGAR SCORES		
	All Births	Vaginal Births	C/S Births	All Births	Vaginal Births	C/S Births
# with score 0 – 3						
# with score 4 – 6						
# with score 7 – 10						

CORD GASES:

	LIVEBIRTHS	STILLBIRTHS	NEONATAL DEATHS	TRANSFERS AND/OR NICU ADMISSIONS
# W Known Art pH				
# With Art pH < 7.2				
# W Known Art B Base				
# W Art B Base < 35				
# W Known Ven pH				
# W Ven pH < 7.2				
# W Known Ven B Base				
# W Ven B Base < 35				

SAMPLE PHYSICIAN DATA COLLECTION FORM:

PHYSICIAN: _____

Total Deliveries: _____ # Vaginal: _____
C-Section: _____

Deliveries with 1 or More Previous C/S: _____ # Vaginal: _____
C-Section: _____

C-Section Deliveries with Primary Reason of: Dystocia _____
Breech/Abnormal Lie _____
Fetal Distress _____
Prev C/S _____

Vag Deliv with Known Length Hosp Stay: _____ Mean Days Stay: _____ Variance: _____
C/S Deliv with Known Length Hosp Stay: _____ Mean Days Stay: _____ Variance: _____

Livebirths _____

Births Transf
and/or Adm NICU _____

Survivors (not transf or adm to NICU) with Known Length Hosp Stay: _____
Mean Days Stay: _____
Variance: _____

Livebirths W Known Art pH _____
Livebirths W Art pH < 7.2 _____

Livebirths W Known Art B Base _____
Livebirths W Art B Base < 35 _____

Livebirths W Known Ven pH _____
Livebirths W Ven pH < 7.2 _____

Livebirths W Known Ven B Base _____
Livebirths W Ven B Base < 35 _____

Glossary of Terms

Appendix XIII

Augmentation (of labour)	The use of oxytocin to stimulate/accelerate the progress of labour.
Auscultation	Listening with a stethoscope (sometimes specially adapted) to body sounds – e.g. listening to the fetal heart rate with a special fetoscope; does not use ultrasound or any electronic methods.
Amniotomy	The rupturing of the amniotic sac (bag of waters around the fetus) using a sterile instrument. Sometimes done to induce or speed up labour.
Antenatal or Antepartum	Often used interchangeably with each other and with prenatal. The time before birth.
Bishop Score	A scoring system to assess the readiness of the uterine cervix for labour. The higher the score, the more changes have occurred, such as softening, shortening, slightly dilating.
Cervix	The neck of the uterus; the portion that extends into the vagina. The cervix must dilate during labour to allow the fetus to be born.
Classical Incision (cesarean section)	A vertical incision into the upper portion of the uterus; rarely used.
Dehiscence	The separation of tissues along natural lines or at the site of an incision.
Dystocia	A general term for labour which progresses more slowly then expected, or labour which is not progressing.
Electronic Fetal Monitoring	The continuous monitoring of the fetal heart by a transducer placed on the mother's abdomen over the area of the fetal heart or an electrode inserted through the cervix and clipped to the baby's scalp. Labour contractions are monitored also with a sensor placed on the mother's abdomen or a catheter inserted through the cervix into the amniotic fluid.
External Cephalic Version	The process by which a caregiver turns a fetus from a breech presentation to a cephalic (head first) presentation by pressing on the mother's abdomen and guiding the fetus into the new position.
Induction (of labour)	Process by which labour is initiated artificially, often by intravenous drip or amniotomy.
Intrapartum	During labour.
Labour	The physiological process by which the baby is gradually expelled from the uterus into the vagina and then to the outside of the body. Syn. Childbirth; Parturition. **First Stage:** (stage of dilatation). Period from the onset of regular contractions of the uterus until the cervix is fully dilated. Averages 12 hours in primigravidas and eight in multiparas, but may be much shorter or longer. **Latent Phase:** The early part of the first stage; usually up to 3 cm dilation; contractions are weakest and their pattern is not well established. May last for many hours. **Active Phase:** The later part of the first stage when the cervix dilates more quickly and contractions are more intense. **Second Stage:** (stage of expulsion). Period from complete dilation of the cervix through the birth of the baby. *Averages* 50 minutes duration in primigravidas and 20 minutes in multigravidas but may be shorter or longer.
Macrosomic	A large infant, usually means weighing over 4500 g at birth.

Morbidity	Illness, disease, abnormality.
Febrile Morbidity	Fever present with illness.
Multigravida	A woman in her second or subsequent pregnancy.
Multipara	A woman who has borne more than one child.
Neonate	An infant who is 1-28 days old.
Nullipara	A woman who has not given birth previously.
Oxytocin	A hormone that produces uterine contractions.
Partogram	A graphic representation of the length of labour; used to help establish a diagnosis of dystocia.
Perinatal Period	The time after the 28th week of pregnancy through 28 days following birth.
Perinatal Mortality Rate	The number of stillbirths plus the number of deaths occurring in the perinatal period as a rate per 1,000 live and still births.
Postnatal or Postpartum	Used interchangeably. Means the time after birth.
Primigravida	A woman who is pregnant for the first time.
Primipara	A woman who has given birth, or is giving birth to her first child.
Prostaglandin	An active substance found in many body tissues. Uterine muscle stimulation can result from certain of the prostaglandins. The substance is commercially produced and is available in a gel for use in stimulating contractions.
VBAC	Vaginal Birth After a previous Cesarean section.